The Chemical Age

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Contents

PAGE

EDITORIAL: Our Metallurgical Section; Popular Science Exposition; "Standard Price" of Gas; Eyesight Treatment in Chemical Works 1
The Problem of Detonation in Motor Fuels: Harold Moore, M.Sc. 4
Correspondence: The Chemistry of Rosin, etc. 5
Electrification of the Colloid System: Randy's Reflexes—VIII. 6
Reviews 8
Scientific Novelties Exhibition 11
Dyeing of Cellulose Acetate Silk 12
A Non-Sticking Valve for Chemical Works 14
From Week to Week 15
References to Current Literature 16
Patent Literature 17
Market Reports 20
Company News; Chemical Trade Inquiries 25
Commercial Intelligence; New Companies Registered 26

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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INDEX TO VOLUME IX.

With this issue is published the Index to Volume IX. of THE CHEMICAL AGE, *covering the period July–December*, 1923.

Our Metallurgical Section

IN this number appears the first issue of our Monthly Metallurgical Section, which will appear regularly the first week in each month. Chemistry and metallurgy are so closely allied that almost anything of interest to the one branch must be of interest to the other, and nothing but good can come of a closer mutual acquaintance. The new feature, therefore, while making a definite appeal to the metallurgical interest, may reasonably be expected to make the journal still more useful to readers of THE CHEMICAL AGE. To the first number, Mr. Fred Clements, M.Inst.C.E., M.I.Mech.E., contributes a valuable article on "Probable Developments in the Manufacture of Iron and Steel"; a well-informed Northern correspondent in the closest touch with the industry discusses industrial and commercial conditions; and the other features include "Metallurgical Topics of the Month," notes on new patents, a short index to current metallurgical articles in the technical press, and commercial intelligence. We have received many favourable expressions of opinion on the idea, and if the Section appeals to those it is intended for its scope may presently be extended.

Popular Science Exposition

IT was Dr. Ruttan, if we remember rightly, who remarked to us during his stay in England that one of the first things he noticed here was the absence of any publications intended to give the public some popular idea of scientific progress and its bearing on human needs. The difficulty in the past has been to find those who could expound science accurately and yet in a way that the ordinary citizen could understand, and in the case of chemistry, in many ways the most fascinating of all the sciences because it touches life so intimately, the idea of presenting it in terms intelligible to the public has almost been abandoned as hopeless. The extraordinary interest, however, which Sir William Bragg's Christmas lectures at the Royal Institution have attracted, shows how fallacious the latter view is. If one of our greatest scientists can find in a subject like "the Atom" matter that can fascinate the attention of children, it suggests that the difficulty of interpreting chemistry is not in the science but in the exponent.

It is sometimes assumed that "popular" exposition must necessarily be cheap, and therefore rather beneath the level of the truly expert mind. The truth is really the other way round. It is his largeness and clearness of vision which enables a master of any subject to make its difficulties appear so simple; it is the restriction of vision to details which prevents the mere technical expert from really seeing his own subject as a whole, and the obscurities of language on which he too often relies are merely a reflection of complicated mental processes. The distinction has been well summed up in a description of two types of musical conductor—the one with the score in his head, the other with his head in the score.

"Standard Price" of Gas

THE result of the recent proceedings which have been taking place in connection with the standard price of gas of the Gas Light and Coke Company seems to have been entirely misconstrued in the daily Press. One evening journal boldly announced that as a result of the London County Council's action gas in certain parts of London would be reduced in price by 4d. per therm. It did not proceed to explain in what manner it had suddenly been found possible to cut our gas accounts in two, but it certainly did expose its ignorance of the legislation which governs the statutory gas undertakings in this country. The true meaning of this 4d. cut will be readily understood when it is recalled that the dividends which gas undertakings are empowered to pay are based upon the current price charged for

gas. In other words, the dividend varies in accordance with a "sliding-scale." We can best understand the operation of the system by considering a see-saw, one end of which represents the price of gas and the other end the dividend which may be paid. When the see-saw is horizontal we have the two ends representing the "standard price" and "standard dividend"—*e.g.*, with gas selling at (say) 15d. per therm the undertaking is empowered to pay a dividend of 5 per cent. As, however, the price of gas undergoes reduction so does the permissible dividend rise, and, conversely, the amount of the dividend "slide" per unit variation in the price of the gas being determined by the Board of Trade.

In 1921 the Board of Trade fixed a "standard price" for the Gas Light and Coke Company of 15·2d. per therm, which meant that the standard dividend could be paid so long as the price of gas did not exceed this figure. This standard was obviously designed to meet the abnormal conditions then prevailing, and with materials and labour having fallen considerably in value, the London County Council considered that the time had arrived for revision. The net result of the proceedings is that the "standard price" of the Gas Light and Coke Company has been reduced by 4·2d. per therm; but as the company has refrained from paying the dividends which its former standard permitted, it is unlikely that either shareholders or consumers will find that the recent decision will make any difference to them.

Eyesight Treatment in Chemical Works

MANAGERS of British chemical works may be interested in an experiment in eye examination which was started five years ago at the Wilmington chemical and dyestuffs plant of the great Du Pont Co. During that time 1,578 employees at the dye works have received eye examinations, and it is the practice of the company to encourage all the plants to provide goggles for the individual worker. At the dye works eye protection is promoted by a works safety committee, and penalities are imposed for failure to comply with the rules issued by the committee. Owing to the vigilance of this committee the eye-accident reduction rate for the period during which the eye protection campaign has been in operation is 66 per cent. There were only three lost-time eye accidents during the first six months of 1923. Since approximately 25 per cent. of the work of the plant throughout the year is done with artificial light, thoroughly up-to-date equipment is used to provide proper lighting. This matter is under the control of the electrical division of the engineering department. Full advantage is taken of daylight wherever possible. The correct size of lamps and the distribution of the light is determined by scientific study. When deemed advisable walls and ceilings are painted to improve the lighting system. Each building in the plant is required to keep a check on its lighting equipment, defects, rearrangements, etc., and to report to the electrical division.

Those who know the Du Pont organisation at Wilmington will readily agree with us in describing it as one of the finest in the world, and this is by no means the only matter in which expenditure and consideration for the comfort and health of the worker has been found to pay. Correctly adjusted lighting, clean walls and ceilings, and furnishings designed to make work as easy instead of as difficult as possible add not only to the worker's self-respect, but to his respect for the firm. On the other hand, neglect of them reduces efficiency, chills enthusiasm, and often produces just that disaffected state of mind which it is the art of good management to prevent. In addition —and not the least important point—there is the impression inevitably left on the minds of visitors by good or bad conditions.

A Chance to Visit the States

IN connection with the meeting of the American Chemical Society in Washington next April we learn that there is a strong desire for the attendance of one or more representatives of British chemistry or chemical engineering, and that if any who contemplate a trip to the United States this year could arrange for their visit to coincide with the A.C.S. convention week, they would be heartily welcomed by their American colleagues. On similar occasions in the past, arrangements have been made by American organisers to bear a part of the travelling expenses, and to arrange for addresses from the visitor or visitors before the local sections of the society in other large cities which they may contemplate visiting. In this way it is often possible materially to reduce the cost of the stay in America, and at the same time to afford more than the usual opportunity of making acquaintances and visiting prominent chemical or business centres. It is suggested that some such arrangement might be made in the case of visitors who are well recognised as authorities in their particular field and who could speak forcefully and acceptably in good English. If any of our readers possessing this sort of qualification would care to visit Washington in this unofficially representative capacity, we shall be glad to forward a note of their names and arrangements to the proper quarter.

Urea as a Fertiliser

IN the article dealing with developments in the heavy chemical industry which Mr. P. Parrish contributed to the Review Number we published last week, the writer brought into prominence in one sentence a problem which all producers of combined nitrogen must find of more than ordinary interest. Mr. Parrish stated that "a process for the cheap production of urea is badly needed." Another of our contributors who has an intimate knowledge of the conditions associated with the German nitrogen industry has already alluded to the fact that, although in that country a good deal of attention has lately been given to ammonium nitrate and some of the double salts, urea is the compound which is considered to have the greatest future before it, for it contains a remarkably high proportion of

nitrogen (46 per cent.), and combines the fertilising properties of sulphate of ammonia and nitrate of soda. The extremely high nitrogen concentration entails, in addition, a great saving in transport charges. Mr. Parrish pointed out, however, that several practical considerations still militate against the application of a recent method of production in which thoria is used in connection with ammonia and carbon dioxide; but it is conceivable that some catalytic process, effected at ordinary pressures, will eventually be evolved as a permanent solution of the problem. Again, there appears to be some considerable prospect for utilising cyanamide for conversion subsequently into urea. One comparatively simple German process consists in warming an acidified solution of cyanamide to which a catalyst in the form of ferrosoferric oxide is added, the process of transformation being completed in the space of about an hour. There are, of course, quite a number of other promising methods for producing urea, and one prominent authority on the subject has given the opinion that it is by no means unlikely that the manufacturer of nitrogenous fertilisers from synthetic ammonia will ultimately take the form of the conversion to urea instead of to ammonium salts. If carbonic acid can be used successfully it is cheaper than sulphuric or hydrochloric acid, and ammonium nitrate, besides being under a cloud since the Oppau disaster, has not by any means caught on as a fertiliser.

"Bayer 205"

PROFESSOR KLEINE, the German scientist, has recently returned from the Congo, where he has been studying the curative properties of the drug known as "Bayer 205" in cases of African sleeping sickness. Although older drugs containing arsenic, antimony and other poisons have been tried, sometimes with beneficial results, the new drug would appear to have been very much more effective, and has to its credit a number of cures even in cases where the disease had reached an advanced stage. There are, of course, a number of points in connection with the manufacture of the drug which have not been divulged, but one of the most interesting facts known about it is that it is a chemical individual containing only carbon, nitrogen and hydrogen, which is derived from azobenzene. The compound was first manufactured over three years ago at the Bayer Works in Leverkusen, near Cologne, and was passed on to Dr. Kleine so that it might be tested under tropical conditions, with the satisfactory results already referred to. It has been pointed out that although the results from the use of the drug are really remarkable, owing to the secrecy surrounding its manufacture, what amounts almost to the key to the tropics is in German hands. There seems no reason to suppose, however, that the drug cannot be manufactured in England equally well, as it is a chemical compound of definite composition, and our fine chemical manufacturers are quite capable of repeating or even improving on the present method of preparation, though it must be admitted that much patient research may be required before we could be independent of German supplies.

Points from Our News Pages

Mr. Harold Moore, in a paper on "Detonation in Motor Fuels," suggests close co-operation between engineers and chemists in attacking internal combustion engine problems (p. 4).

Letters are contributed by Charles E. Soane ("The Chemistry of Rosin"), Allen and Hanburys, Ltd. ("Production of Insulin"), and T. K. ("Activated Carbon") (p. 5).

The last of the series of articles under the head of "Randy's Reflexes," in which the problem of chemical change has been much discussed, appears this week (p. 6).

Reviews are published of a number of recently issued text-books on Chemistry and allied subjects (p. 8).

Particulars are published of the scheme proposed in connection with "exceptional" railway rates as a result of negotiations between the A.B.C.M. and the Railway Rates Tribunal (p. 10).

In our London Market Report prices are described as mainly unchanged and very firm, and export business as fairly satisfactory (p. 20).

Business in the Scottish Chemical Market has been very quiet, owing to the New Year holiday (p. 23)

The Calendar

Jan.		
7	Society of Chemical Industry (London Section): Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, W.1.
7	Institution of Rubber Industry (London Section): "Consistency of Rubber and Rubber Compounds." Dr. S. S. Pickles. 8 p.m.	Engineers' Club, Coventry Street, London, W.
8	Institute of Metals (North-East Coast Section): "The Action of Molten Brass on Nickel-Steel." H. M. Duncan. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
8	Institute of Metals (Birmingham Section): "Nickel Brasses." O. Smalley. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
8	Hull Chemical and Enginering Society: "X-Rays and Their Application." J. Pryce Jones. 7.45 p.m.	Hull Photographic Society's Rooms, Park Street, Hull.
10	Institute of Metals (London Section): "X-Rays and Metallurgy." W. T. Griffiths. 8 p.m.	85–88, Minories, Tower Hill, London.
10	Institution of Mechanical Engineers (Glasgow Section): "Radiation and Atomic Structure." Professor J. Muir. 7.30 p.m.	Royal Technical College, Glasgow.
11	Institute of Metals (Sheffield Section): Conjoint Meeting with the Institute of British Foundrymen. "Influence of Casting Temperature on the Physical Properties of Metals." F. H. Hurren. 7.45 p.m.	Albany Hotel, Fargate.
11	Society of Chemical Industry (Manchester Section): "Fuller's Earth." A. Brittain; and "Fractional Distillation." C. Elliot. 7 p.m.	Textile Institute, 16, St. Mary's Parsonage, Manchester.
11	Society of Dyers and Colourists (Scottish Section): "Dyeing of Artificial Silk." W. E. Sanderson.	
11	Society of Chemical Industry (South Wales Section): "Cocoa." H. W. Bywaters. 7.30 p.m.	Technical College Cathay's Park, Cardiff.
12	West Yorkshire Metallurgical Society: Annual Dinner.	George Hotel, Huddersfield.

The Problem of Detonation in Motor Fuels

By Harold Moore, M.Sc. (Tech.) A.I.C.

The subject of "Detonation in Motor Fuels" was dealt with by Mr. Harold Moore, M.Sc. (Tech.), A.I.C., in the following paper before the Evening Students' Chemical Society at the College of Technology, Manchester. Mr. G. F. Robertshaw presided. As an introduction to the paper Mr. Moore emphasised the fact that internal combustion engine problems require the close co-operation of engineer and chemist.

One of the most important and interesting of the motor problems is that of detonation. The term pinking as used by motorists really covers two phenomena—pre-ignition and detonation. Pre-ignition of the charge, that is, explosion before the end of the compression stroke, is generally due to an overheated engine, to too early spark timing, or to incandescence of the cylinder walls. Any of these conditions will cause premature explosion which by impact on the rising piston gives rise to "knock." Detonation takes place when the fuel mixture and compression are such that the explosion velocity is extremely high. The conditions which tend to produce pre-ignition are often favourable to detonation.

In the course of researches on the problem of the difficulties experienced in obtaining regular ignition when attempting to burn oils originating from coal tars in Diesel engines, it was realised that fuels possessed some property which was not brought to light by those tests which were usually applied to fuels. It appeared to be possible to have two fuels alike as to chemical and physical properties which gave different performances in engines.

Diesel and Motor Engines

In order completely to realise the nature of the problem of detonation and the difference in performances given by the same fuel in the Diesel and the motor engine, it is necessary to make clear the complete difference between the operation cycles of these two types of internal combustion engine. In a Diesel engine air is admitted into the cylinder and compressed by the piston to about 500 lb. per sq. in. The fuel is sprayed into the compressed air and fired by the heat generated by the compression of the air. In the petrol engine a mixture of fuel and air is drawn into the cylinder and fired by means of a coil or magneto induced spark. While the Diesel engine must have a very high pressure in the cylinder in order to bring the injected fuel to such a temperature that it will ignite, in the petrol engine, if the pressure is raised above a certain maximum for a given set of conditions, the engine loses power and finally stops, the fuel having detonated instead of igniting normally.

The thermal efficiency—*i.e.*, the ratio of heat supplied as fuel to brake horse power developed, of both the Diesel and the petrol engine, is low, the former being about 33 per cent. and the latter about 22 per cent. In the petrol engine, theoretically it should be possible, by increasing the compression ratio, to effect an improvement in efficiency. The compression ratio is the ratio between the volume of air and fuel drawn into the cylinder and the volume to which it is compressed by the upward stroke of the piston. With petrol as fuel, however, the pressure in the cylinder cannot be increased above certain figures owing to detonation.

In 1913 two Swiss chemists, Constam and Schlapfer, devised a rapid means of determining the ignition point of liquid fuel. The apparatus consisted of a small platinum crucible placed in a larger crucible, the intervening space being filled with sand. The temperature was measured by means of a thermo-couple. The results obtained were not very regular, the error being of the order of +30°. Later, Mr. Moore devised another form of ignition tester which has given concordant results. The instrument consists of a block of cast iron, the base of which has been turned in a lathe in deep grooves in order to present greater heating surface to the flame of the burner. In the centre of the upper surface is a hole machined to fit exactly a platinum or nickel crucible. The cover, which protects the crucible from draughts, is provided with two holes, one for inlet of oxygen or air, the other for admission of the substances to be tested. The gas passing into the crucible is pre-heated by passing through holes drilled in the casting, so that it is at the temperature of the apparatus. The temperature is indicated by a suitable method.

The method of operation is to pass the gas through the apparatus at a certain slow rate, bubbles through a drying bottle of sulphuric acid indicating the rate, and then, when the desired constant temperature is obtained, to introduce one drop of the substance through the hole in the centre of the lid. If the temperature is above the ignition point of the fuel an explosion takes place, and the ignition point is the lowest temperature at which the explosion follows the introduction of the substance under examination. With this apparatus the following results were obtained :—

Aliphatic series.		Aromatic series.	
Petrol	270–280° C.	Benzol	566° C.
Kerosene ..	250–252° C.	Toluol	516° C.
Wax	245° C.	Xylol	484° C.

Miscellaneous :
Alcohol, 395° C.
Ether, 190° C.
Carbon disulphide, 113° C.
Creosote, 440–500° C.
Low temperature tars, 307° C.

From a consideration of a number of ignition point figures certain generalisations have been formed :

(1) Compounds containing simple molecules have higher ignition points than compounds of the same series containing more complex molecules.
(2) The ignition points of aromatic compounds are much higher than those of aliphatic compounds.
(3) Unsaturated hydrocarbons have slightly lower ignition points than the corresponding saturated hydrocarbons.

It will be noted on reference to the figures given above that the fuels having the high ignition points are those which are suitable for use in Diesel engines. In the petrol engine the fuels having low ignition points give rise to detonation when the pressure in the cylinder exceeds about 100 lbs. per sq. in.

Efficiency Dependent on Compression Ratio

In internal combustion engines, whether of the two-stroke or four-stroke cycle, the theoretical thermal efficiency is dependent upon the compression ratio. This applies to engines operating both upon the constant-volume and constant-pressure cycles. The extent to which the compression ratio may be increased is limited by the practical difficulties of the construction of an engine to withstand the stresses of high compression, by the friction losses between the cylinder and piston and the occurrence of detonation.

In 1913, Ricardo, by using a variable compression engine, investigated the effects of compression ratio on the efficiency of engines. He proved that whilst paraffinoid and naphthenic hydrocarbons are rather prone to detonate, benzol, toluol, xylol will withstand very high compression ratios without detonation occurring. He found that in this engine it was impossible to cause alcohol to detonate.

By a comparison of the tendencies to detonation of a number of possible motor fuels and taking as one the value of benzol in preventing detonation he arrived at the following figures :—

Anti-Detonation Values.			
Benzol	1	Alcohol	2·25
Toluol	1·5	Acetone.....	1·14
Xylol	1·28	Ether.....	1·0

These figures do not show direct relationship to the ignition point figures, but the latter do not hold when, as in this case, mixtures are being used. Ricardo's work showed that detonation could be prevented even at considerably increased pressures by the use of fuels containing benzol or alcohol, and led to further work by Midgeley and Boyd of the General Research Corporation, Ohio, on Anti-Knock Compounds (J.I.E.C., 1922, p. 589, p. 894).

T. Midgeley, Jun., and T. A. Boyd used as the detonation measuring apparatus an opening in the head of the cylinder of a petrol engine, which was fitted with a small piston. This piston was held down by a powerful spring and had resting by gravity on its upper side a heavy steel pin. Above the steel pin a pair of contact points were connected in series with a

source of current and an electrolytic cell. During normal combustion the piston moves up and down a minute distance moving the pin with it. When detonation occurs the pin is thrown free of the piston and closing the electrical circuit causes gas to be collected in the cell. This gas was a measure of the amount of detonation which occurred during the run of the fuel under examination. Kerosene, which even with low compression, causes considerable detonation, was used as the basic fuel and various substances were added and the determination of detonation was measured quantitatively. In this manner the "Anti-Knocking" values of a great number of chemical compounds were obtained.

Amongst other results, the following were obtained :

Ethyl iodide	15·5
Xylidine	12·5
Tetra ethyl tin	21·0
Di ethyl selenide	62·5
Di ethyl telluride	25·0
Tetra ethyl lead	600·0

and so on.

By adding traces of tetra ethyl lead to petrol it is possible to increase the efficiency by as much as 40 per cent. of its value (*i.e.*, from 20 to 28 per cent. efficiency). A petrol containing this substance and a small amount of carbon tetrachloride, which is added to remove the lead in the form of lead chloride and to prevent corrosion of the sparking plug points, is sold in America as ethyl gas. To lessen the cost of the anti-detonators Claudel Hobson has patented a carburettor which has two or more jets. The main jet supplies petrol, and when on full load a choke is opened bringing an auxiliary jet fed with petrol and an anti-detonator into action.

The addition of water to the fuel also has the effect of increasing the efficiency in certain directions, and Low has recently patented a fuel consisting of an emulsion of petrol and water.

Sundry Points Answered

In reply to questions, the lecturer said that detonation and spontaneous ignition were not quite the same thing. Detonation probably occurred in two stages, the spark igniting the mixture and giving a very rapid flame which creates a very high pressure in front of it and a partial vacuum behind. When the flame speed approaches that of sound the gas in front acts as if it were uncompressible and the heat of compression then causes the detonation.

Water introduced into the fuel is useful if it is free from lime and other salts. When these are present lubrication is interfered with and the cylinder scored.

Carbon tetrachloride was added to ethyl gas to combine with the lead. At the temperature obtained in the cylinder free chlorine if it existed would not be corrosive but when cold it might corrode the exhaust pipe.

Natalite is used for running normal engines, and the powerful anti-detonating effect of the alcohol content will allow of the addition of ether, which, used alone, promotes detonation, without the mixture "pinking" on a normal engine.

Since petrol can be bought in ship load at 7d. per gallon, or in tank wagons at 8½d. per gallon, the lecturer did not think that the hydrogenated naphthalenes could be made cheaply enough to compete with petrol.

Cyclo hexanol had a value in fuels containing alcohol to which it was added to prevent the separation of water from the alcohol. If the alcohol is below 98 per cent. the water will separate out when petrol is added but this separation is prevented by the addition of cycle hexanol.

"Same to You"

THE Editor desires to acknowledge and to reciprocate the many messages of goodwill for the New Year received from readers in this country and the United States, and also to thank those who have sent appreciative opinions on the Annual Review Number published last week. Among the messages received from the United States is the following from the American Trade Journalists' Party who visited this country in 1918 :—

"With renewed faith in Anglo-American ideals for amity and accord among nations and with an earnest desire to strengthen the bonds of friendship among English-speaking peoples, we extend to our British friends this holiday message of peace and goodwill."

The Chemistry of Rosin

To the Editor of THE CHEMICAL AGE

SIR,—In your issue for December 15 there appeared a review of "The Chemistry of Rosin" by H. M. Bunbury, which, when compared with a paper on "The Chemistry of Rosin and Rosin Oil" which it was my privilege to read before the Oil and Colour Chemists' Association in November, 1922 (copy enclosed), shows such remarkable parallelism that one wonders why the earlier paper was not mentioned, as it was fully reported in the *Oil and Colour Trade Journal*, the *Farb. Zeit.* and doubtless elsewhere. However, it is unimportant ; I desire no controversy on that score, but would like to say a word on the anhydride theory.

Rosin chemists seem to have been always rather difficult to convince : the formula C_{20} H_{30} O_2 was only generally accepted some 60 years after it was first proposed ; the anhydride discussion raged for 30 years, and now, long after it appeared to have been settled, Knecht and Hibbert seek to revive it.

The facts against the anhydride theory of colophony are these : (1) The abietic acids (alpha, beta and gamma) in the amorphous state, when kept in a high vacuum for a certain number of hours at certain temperatures, gradually assume the crystalline state (Seidel).

(2) The crystalline acids may be distilled in a high vacuum, the distillate being still crystalline (Seidel).

(3) Amorphous colophony may be made to crystallise from non-aqueous solvents, as petroleum spirit (Schorner).

None of these facts can be explained on the anhydride theory ; moreover, titration of rosin shows it to be composed mainly of acids of molecular weight—302, and not 598.—Yours etc.,

CHARLES E. SOANE.

31, Mattison Road, Harringay, London.
January 1, 1924.

Production of Insulin

To the Editor of THE CHEMICAL AGE.

SIR,—Your article on the British Fine Chemical Industry refers to the production of insulin, but does not state quite correctly the position of affairs. Messrs. Allen and Hanburys, Ltd., and Messrs. British Drug Houses, Ltd., are working in co-operation in the production of insulin, and the million doses referred to have been manufactured and issued jointly by these two firms. We shall be glad if you can make this correction.—Yours, etc.,

ALLEN AND HANBURYS, LTD.,
F. W. GAMBLE, Director.

December 29.

Activated Carbon

To the Editor of THE CHEMICAL AGE.

SIR,—Recently I had occasion to refer to an article on "Activated Carbon," which appeared in your esteemed journal on October 6. I derived therefrom much valuable information, but one point was rather obscure—namely, how to procure this substance. If any of your readers would enlighten me on this point I should be greatly obliged to them and to you.—I am, etc.,

T. K.

Bradford, January 2.

New Year Calendars, Etc.

AMONG the seasonal publications received are wall calendars, suitable for offices, issued by the British Chemical Plant Manufacturers' Association and Crossley Brothers, Ltd., of Manchester, the *Chemist and Druggist Diary* for 1924, a bulky volume of useful trade and technical information for pharmacists, which has reached its 56th year of publication ; the *Vade Mecum*, issued by the Colour Users' Association, a handy little pocket production containing much information relating to the colour industry ; and *The Scientists' Reference Book and Diary* for 1924 (Jas. Woolley, Sons, and Co., Ltd., Manchester, 3s. 6d.), one of the best and most convenient publications of its class.

The Electrification of the Colloid System

Randy's Reflexes.—VIII.

"O thou monster Ignorance, how deformed dost thou look."
HOLOFERNES.

"A good title should aim at making what follows as far as possible superfluous to those who know anything of the subject."
SAMUEL BUTLER.

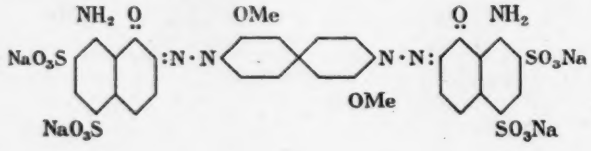
WE question if anyone know anything of our subject: that is why we introduce it. As schoolmaster Holofernes says: *Vir sapit qui pauca loquitur.* No one has the desire to talk about things he knows; there would be no conversation, if we only talked about the known things: our universal ignorance would be so patent; yet the consequences would be delightful, in many ways. We should have no *Lingerie* Press; the word-spinners would lapse and there would be no Brutton-Clockian, front page, platitudinous, literary articles, not even an omnipotent Mr. Brittling to see through everything—himself excepted—including a pluperfect future; Mr. Bernard Shaw would never have been heard of, unless perhaps as a perfect Wagnerite; indeed, bores generally, all of us who take ourselves seriously, would be excluded, even those who write the word with an *h* and still cannot be understood.

All this is *à propos* of the colloid *agate! gregate! aggrate!* or to add a fourth endearment, *aggravate!* Cannot we here imagine a Sir Nathaniel saying aside—'the epithets are sweetly varied, like a scholar at the least!' and an Armado chipping in congruent epithetons, 'Tender juvenal'? We are ever baffled by its strange modes of motion; indeed, all that is clear in the behaviour of colloids is an apparent electrical activity markedly in contrast with their osmotic lethargy. Alone in water, the colloid behaves as an eunuch; put electricity into its soul or maybe its tail, it is a full man and marches with the times—or does it kick the times rapidly past its big body? Why this anomalous behaviour? The "birds of a feather flocking together," of the Bristolian school, isn't a good enough explanation of such strange conduct, whatever be the structure of the watery nest that is built.

Not long ago a friend happened to remark to us: "We know nothing of electrical conductivity in gases! We know less of liquids, yet take we much for granted; indeed, if the prayer books put into the hands of youth are to be believed, we have little to learn, in principle! It were time, that we were more mindful of the injunction—"Let your yea be yea and your nay, nay; for whatsoever is more than these cometh of evil."

To adapt Ruskin science, especially the science of glue and its congeners, the basic materials of life, like "Art, properly so-called, is no recreation; it cannot be learned of spare moments, nor pursued when we have nothing better to do . . . . It must be understood and undertaken seriously or not at all." Especially would we re-echo his footnote—"I wish the 'must' were indeed imperative. The violently increasing number of extremely foolish persons who now concern themselves about pictures (we would say, chemistry) may be counted amongst the meanest calamities of modern society."

Let us re-direct our gaze to the colloids of which we know something—Soap and Congo Red. Bayliss and Donnan agree, that this latter behaves osmotically as a single neutral unit, therefore, not at all according to Cocker, as it is a sodium bis-sulphonate; the case is made a worse one by the fact, that electrically it is quite active; in the language of the elect—we quote Donnan and Harris—"Congo Red, in aqueous solution, behaves as a highly dissociated salt, although the observed value of the osmotic pressure indicates apparently no ionisation." Chicago Blue (? 6B) is still more remarkable; it is formed by coupling two molecules of 1 : 8 Amino-hydroxy-naphthalene-2 : 4 disulphonate with diazotised dimethoxy-benzidine (anisidine); it is, therefore, a dihydroxy-diamino-*tetra*-sulphonate (we give it the quinonoid formula, as salt and acid are both blue).



Looking at the formula, visualising it solid, this is a wondrous mechanism; certainly, "no slouch of a harrow, nuther," could you "get it hitched on good!" It would seem to bristle with centres inviting affectionate embrace; at least two of the sulphonic radicles should be uncontrolled and should be strongly acid, yet according to Bayliss, it has only twice the osmotic activity of a neutral molecule of its "size." Verily, a case of the light being hidden under the bushel!

Apparently, the protein salts affect similar "low" habits. Loeb's experiments seem to show this, though he has not noticed the fact. At asymmetric-osmotic-equilibrium, taking the case of gelatin chloride and hydrogen chloride, the hydrogen chloride is the determining factor on the one side; the opposing influence of the hydrogen chloride, on the gelatin side, is necessarily less than that of the balancing hydrogen chloride, by that exerted by the gelatin salt. Loeb has shown, that the chlorine-ion is in excess on the side of the salt to the extent required to balance the difference between the amounts of hydrogen chloride in the two solutions. He has thus, apparently, given proof that the osmotic effect of the gelatin salt is that of its chlorine-ion alone. A probable estimate of the size of the gelatine molecule would lead us to infer that it may carry 15 atoms of chlorine—so per atom of chlorine, we have to consider the influence of only one-fifteenth of the protein molecule. Still, on the molecular-suicide hypothesis, this fraction should have an effect equivalent to that of the chlorine with which it is associated. Such an error is not possible in Loeb's experiments—his results are too consistent.

All the roads lead to one Rome. Apparently, a very strong case can be made out proving that osmotic lethargy is a characteristic of all colloids. How then are we to explain their electrical efficiency? They are active even when anchored—in jelly form. As Bayliss has told us—they move as wholes under electric stress. How?

Going back to Hardy, we have the fact, that the protein molecule is neutral in an electric field; only its salts are moved, one way or the other. Whilst the protein does not carry a *charge*, the salts do, we are told. Is not the use of this term "charge" but a *facon de parler*? Take an electric railway, the carriages and the third rail are only charged when the current is on; the system is chargeable, at will, however. Is not this equally true of the colloid salt, of potential electrolytes generally? Is not the "charge" a scandio-teutonic myth?

As we are made not of sugar and spice but of electrons—according to our modern faith—of course, everything is to be regarded as charged. It may be difficult, but it is our duty to neutralise the mental charge of verbalisms by which we are afflicted and be clear what we mean. In ourselves there remaineth no item whatsoever of Arrhenic faith to tide us over this difficulty; our soul is dead to the religion, we hold that it comes from the devil—to betray.

To our thinking, the colloid salt-water system may well be likened unto an electric railway; the liquid does the work of the rails and of the conductors, the salt that of the carriage; the current from the liquid somehow gets hitched on to the salt. This may be borne along, as is the railway carriage; but is it not also conceivable, that the carriage may be anchored and the third rail move along—if it be on ball-bearings, such as are the conducting molecules in a solution?

We have previously said that Congo Red is very like a whale: so is gelatin chloride, yet it is more like a long air-ship, with a number of dependent gondolas, each carrying an electric mechanism which can even be worked by wireless. Suppose the air-ship to be fast-anchored and the motors set agoing by wireless—there would be a rush of air past the whole show. The big body of the ship would play no effective part, save by holding up the mechanism; so the big colloid radicle, perhaps. We will not spoil the dream by going into particulars.

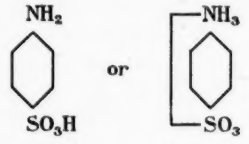
If we be right, Huck Finn was before us. Colloid salts *is* harrows incarnate! If you don't hitch on to one tooth, you're bound to on another, ain't you? And you can't get away with that tooth without fetching the whole harrow along, can you? Let us ponder this imagery.

We are now at a stage in the inquiry when it were well to recall our suggestion, that perhaps colloid salts are but partly

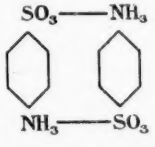
dissolved—dissolved through the agency of the active appendage, yet undissolved in respect of the body proper. If this be granted, it will follow that the relationship with water is different from that of a normal salt (potential electrolyte): which is much the same as to say, what we have already said, that the colloid salt has but "neutral" value: that of its active *a*-colloid radicle.

On this assumption, it should not be reciprocally distributed in the manner the good Henry supposes salts are, against hydrone, but should itself be hydrolated. Would not its simple osmotic behaviour be accounted for, if this assumption were made?

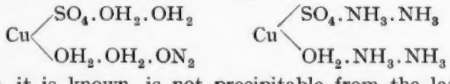
Still, though the argument may apply to Soaps and Protein salts, what of *Congo Red* and Chicago *Blue?* Their *a*-colloid articles are strangely modest in their appearance; yet, if our speculation be sound, they must be the agents of osmotic activity. We have spoken, in our No. IV, of the acid-radicle as somehow tucked away, like Tweedle-dee in the umbrella or as chlorine in a cobaltammine. We have evidence of such curious habit in the prototype of the acid progenitors of the Congo dystuffs—Sulphannilic acid, commonly formulated



We have always had it "in our bones," that the formula should, at least, be duplicated—that the compensation of basic by acid radicle is not *intra*—but *inter*-molecular; that the bowsprit gets mixed with the rudder always—maybe side by side, maybe end to end, maybe superposedly; all this must be left to the X-rays and a sound logic to settle:



Admitted—some may say; but what of the sodium salt? This and other salts of the acid contain water of crystallisation, which, perhaps may help us out of our difficulty—if, as the hoary one suggests, copper sulphate and its ammoniated derivative be closed systems, *e.g.*,



Copper, it is known, is not precipitable from the latter by alkali, it may well be that it is not from the former unless this be hydrolysed and transformed into

$$HO.Cu.SO_4H.xOH_2$$

O, ye of little imagination! To what base uses, to what neglect of opportunity, have we been led by northern narrowness and the eternal droning of the ionomaniacs. In a recent issue of *Blue-Bits*, an all too brief summary is given of an illustrated lecture by Sir William Pope, at Cambridge, on those strange appearances misnamed *Liquid Crystals*; in this account, reference is made to the crystallisation of sodium sulphanilate in two distinct forms, one more soluble than the other; it is easy to follow, under the microscope, the separation of the more soluble from a solution; then, as the liquid cools, its dissolution and the subsequent deposition of the less soluble. Here we have clear proof that some "element of affection for water" is being tucked away in the transition of the earlier into the later form.

Such assumption may not be, seemingly is not, necessary in the case of soap and protein salts. There is distinct evidence, that the lower members of the acetic series tend to polymerise. That they exist as doublets few will doubt—whether they congregate in more complex systems of definite magnitude is open to question. To us it seems clear, however, that the evidence accumulated by the Bristol school is in no way compelling—at least, it does not suffice to prove more than that there is a general tendency for the molecules to cling together. Belief in the existence of a complex definite *micelle*, like many myths, is less a question of fact than of the acceptance of the faith proclaimed by a particular prophet, the faith, in our opinion, exists chiefly in words.

We thus close, as we began, upon the keynote of Sope, without having composed even a movement of the symphony in which ultimately the mystery will be "displayed." By the way, it is curious that we have no verb "to music."

To solve the problem and those of glue and of the glue-stuffs generally, we need broad and logical study of the material as a whole, not narrow inquiry by some one method, let alone one that is purely physical, under strong mental and moral bias. The conventional colloid building put before us is a strange structure: the picture of a street would show only chimney pots—no foundations.

To end the story—our discussion may not have led us far or beyond seeing how little has been done hitherto, how much remains to be disclosed. We make no claim to have found the "Open Sesame" to the cavern and its treasures, only to have shown that there are not a few sites inviting exploration. Workers can but follow the noble example set by Mr. Carter and Lord Newton and dig on methodically and with honest purpose; the buried treasure is greater than that of Tutankamen! As for ourselves, since leaving Cambridge, we have travelled far and have been led, unexpectedly, to attempt a peak then but dimly in view; though encouraged to think we have done some useful mapping, we return, foiled, for the time, glad of rest but hoping to refit for a later expedition.

For previous articles, see CHEMICAL AGE, July 21, August 25, September 1, 8, 15, 22, October 20, November 17, December 1.

Low Temperature Carbonisation

Commercial Success Claimed for Process

AT the annual meeting of Low Temperature Carbonisation, Ltd., held in London, on December 28, the chairman (Colonel N. G. Thwaites) said that the commercial success of carbonising coal at low temperature had been definitely established as a result of operating the Barnsley plant on a commercial scale for the past two years, a period of active constructional work. During that period the works had been producing the high-grade smokeless fuel "Coalite." Sales contracts for the forward delivery of 250,000 tons of "Coalite" per annum over the next four years had been made with one of the leading firms of coal distributors in the United Kingdom, who were prepared to increase their contracts to 1,000,000 tons a year as soon as plants had been erected to fulfil this demand. To cope with these sales contracts the works at Barnsley were being enlarged to produce 150,000 tons of "Coalite" per annum, and the directors were pleased to be able to state that they had completed the necessary financial arrangements on satisfactory terms for this further extension, and also for the erection of similar plants in Staffordshire and other coal-producing counties.

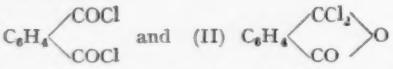
Not only had the production of domestic smokeless fuel been commercially proved, but the company was also actively engaged in producing smokeless fuel in industrial form for burning under boilers, or in pulverised or powdered "Coalite" condition. The directors were satisfied that the scope for the company's process was practically unlimited in its application, not only in this country, but throughout the coal-producing world. Orders obtained from the Japanese Admiralty furnished evidence of this.

In concluding, Colonel Thwaites said that the year 1924 promised to be the most important milestone in the history of carbonising coal at low temperature. They were assured of a prosperous period of full-time activity, culminating in a full recognition by the gas and coal-mining industries of the fact that there was now better solution of their particular domestic and industrial difficulties than by and through the constructive methods of carbonising coal at low temperature, which, in addition, conserved the coal resources of the country. Low temperature carbonisation anticipated necessity. It was a creative movement in that, while supplying the demand for a solid smokeless fuel, which gave the Britisher the open fire which, above all things, he cherished, it eliminated waste by conserving the products of coal.

Reviews

SYSTEMATIC ORGANIC CHEMISTRY. By W. M. CUMMING, I. VANCE HOPPER and T. SHERLOCK WHEELER. London: Constable and Co., Ltd. Pp.536, 25s.

THIS volume describes 492 preparations, covering a very wide range of organic chemistry. In most cases the formulæ and equations are given in detail. A concise exposition of the theory and one or two references to the scientific literature precede each group of reactions. It also includes a description of the current methods of organic analysis and of the identification of the more common organic acids, alkaloids, and carbohydrates. It would be hardly fair to make a critical investigation of every method outlined. The ambitious character of this treatise and the wide range of materials it embraces would make it well-nigh impossible to give in every instance the best methods. Here and there, of course, improvements could be made. For example, on pages 80, 81, and 115, mention is made of phthalyl chloride, and the possibilities of the alternative formulæ



are discussed. However, no note is made of the fact that both chlorides have been actually prepared (*Ott. Annalen, 392*, 1912, pages 245, etc.) The symmetric form (I) melts at 15–16° C., the lactone form (II) melts at 88–89° C.; both boil at 275.2° C. and 719.8 m. pressure. (I) is converted into (II) by treating it with anhydrous aluminium chloride, and (II) into (I) by heating or distillation. On pages 135, 493 and 494, when discussing the preparation of ethyl acetoacetate, its properties and the estimation of its keto and enol forms, it would have been an advantage to point out that both forms have actually been isolated, and their properties investigated (*Knorr, Ber.* May, 1911). The book gives an illustration of the progress of organic chemistry, including such preparations as acetaldehyde from acetylene, chloramine-T, arsanilic acid, etc. The catalytic action of metals is depicted by the inclusion of hexahydrobenzene, hexahydrophenol and acetaldehyde. It is satisfactory to note that as a result of the Great War and the demands it made on the British chemists, there has been a notable increase in the publication of chemical treatises, and the present volume will no doubt form a useful addition to chemical libraries, and prove of service to every student of chemistry

S. P. S.

THE CHEMISTRY OF PAINTS, PIGMENTS, AND VARNISHES. By J. GAULD BEARN, D.Sc., A.I.C., F.C.S. London: Ernest Benn, Ltd. Pp. 278, 30s.

This new publication appears at first glance to embrace too great a field to effectively deal with each subject. The author, however, very wisely avoids prolixity in dealing with manufacturing processes, enough information only being given to explain the general outline of the methods used. A valuable feature of the book are the specifications given for each product, and might well prove a step in the direction of the adoption of standard specifications throughout the trade. Many valuable hints on the chemical analysis of each subject are included. The importance of the evaluation of paints, colours and varnishes by physical methods is well emphasised throughout the work and very ably dealt with.

The book is divided into three parts—viz., paints, pigments, and varnishes. That of paints also including such special products as anti-fouling compositions, distempers and luminous paints. The Varnish section deals somewhat briefly, but very ably, with a difficult subject. Part II on pigments is particularly good, with, perhaps, the exception of the chapter on lakes, the subject of lakes and dyes being somewhat too vast to deal with in a brief manner.

The author's style throughout is good, many useful tables are included, the whole book being well indexed. Although little new matter is contained it is thoroughly up to date, and deals concisely and comprehensively with a large number of products of interest to the paint and colour trades, and should prove a valuable addition to the works chemist library and fulfil a much-needed want by supplying a handy book of reference to all those who must needs analyse paints and colours.

P. R. K.

LEAD. By J. A. SMYTHE, Ph.D., D.Sc. London: Longmans, Green and Co., Ltd. Pp. 343. 16s.

Dr. Smythe, in writing this book, has added the latest volume to the Monographs on Industrial Chemistry, which are acknowledged to form a series of considerable technical importance. The author has succeeded in maintaining the level of merit of this work well up to that of preceding volumes, and the book should not be missed by any serious student of metallurgy.

There are some points of constructive criticism which may be mentioned in the hope that the issue of a second edition, which will not be long delayed, may permit of their revision. The reading of the book would be rendered easier if the matter was made more concise by sub-dividing into shorter paragraphs each with its own heading. The practical operation of the plants in commercial use ought to be dealt with more fully with more exact indication of the results obtained.

The author is ill served by the illustrations given, which are mainly extracts from other books of earlier publication. These in no sense express the latest development in this type of metallurgical plant, and whilst the decline of the lead industry in this country renders the use of plant of the newer type difficult, for financial reasons, yet due regard ought to be paid to the more recent furnaces in use in America.

The book opens with an interesting chapter on the "History of Lead," which is one of the most complete we have seen, and the Chapters ix. to xi. inclusive, dealing with the "Uses and Preparation of the Compound of Lead," form a valuable survey of this important section of the subject.

The remainder of the book deals with the various methods of the extraction of lead from its native ores and is complete apart from the comments we make earlier.

FRED CLEMENTS.

ORGANIC CHEMISTRY FOR ADVANCED STUDENTS. By J. B. COHEN, Ph.D., B.Sc., F.R.S. Fourth edition. Part III., 412 pp. E Arnold and Co. 1923. Price 18s.

Parts I. and II. of the new edition of Prof. Cohen's book were recently reviewed in these columns. Part III., "Synthesis," is now published, and contains 34 pp. more than the corresponding part of the 1918 edition. To chapter I. (carbohydrates) have been added accounts of the researches of Irvine on γ-sugars, lævoglucosan, maltose, melibiose and cellulose, of Haworth on cane-sugar, lactose and cellobiose, and of Bergmann and Schotte upon glucal. The chief addition to chapters II. (fermentation) and III. (purines) is the very excellent tabular view of Biltz' investigations (p. 123). In chapter IV. (proteins) note is made of Dakin's new amino-acid, Sasaki's synthesis of tyrosine, Kuster and Weller's synthesis of hæmatic acid and Levene's work on hexosamines. The terpene chapter has been brought up to date by the inclusion of Ruzicka's synthetic researches on pinene and fenchene, and a section on menthone has been added. Perhaps a little condensation in the earlier parts of this chapter would have made room for a few notes introductory to the recent brilliant work from Zurich on the sesquiterpenes and abietic acid.

The statement on p. 236 that "the structure of camphene is still doubtful" is a misrepresentation which is corrected on the same page by the citation of half-a-dozen facts which "point unmistakably to the formula for camphene proposed by Wagner."

The book concludes with a well-arranged and discriminating review of alkaloid chemistry which contains much new matter, including the views of Robinson and of Baly and Heilbron on the genesis of alkaloids in the plant, the synthesis of hygrine, tropic acid, ecgonine, laudanine and dihydrocinchininone, and notes on pilocarpine, scopoline, hyoscine and the pelletierines.

A few typographical errors have been noted and in one or two places the style is less careful than usual—(*e.g.*, p. 279, "attempts . . . of producing the substance"; p. 217, sylvestrene "is purified by *separating* it from the crystalline dihydrochloride by boiling with aniline"—"regenerating" would be less ambiguous; p. 302, "Having set forth the facts . . . the issue narrows itself"). On p. 310 the alkaloids are said to "arise from the breaking down of more complex substances, which then combine with other compounds present in the plant," which is not exactly what Prof. Cohen (or Pictet) meant.

Apart from these few small lapses the book is a model of the essay type of treatise, and can be strongly recommended to all organic chemists who wish to keep pace with the progress of their subject. It provides an excellent and substantial basis which will enable the student to appreciate and to evaluate current chemical literature. C. H.

COAL TAR DISTILLATION. By ARTHUR R. WARNES. London: Ernest Benn. Pp. 511. 45s. net.

The distillation of coal and other tars is an industry which within late years has assumed such importance as to have an association (the Tar Distillers' Association) all to itself. Taking the process of distilling crude tar *per se*, one would imagine that the author's public was not a particularly wide one; but no one can tell where some sort of indirect interest in the process begins or ends, and there must be a multitude of industrial chemists who would find themselves in a sorry plight if they were suddenly called upon to make shift without the products which have their genesis in coal tar. Perhaps it is this fact which has contributed towards making Mr. Warnes' book a "best seller," and we have no doubt that he will soon have to be getting busy again on the preparation of yet another edition. The material put into the book is mainly conspicuous for the fact that it breathes throughout the atmosphere of the practical man who has grown up with every detail of the process, and who has had to deal first-hand with all those little annoyances which beset the works' manager when things go wrong, as they will. Text-book writers are too apt to overlook that present-day readers do not ask for a mere collection of other people's work, but they want to be put into a position of being able to draw on the experience of an individual whose walk in life has provided him with exceptional opportunities which the reader himself has been denied. Mr. Warnes has had such experience, and he sets it forth in a lucid style with which not every practical man is gifted. If criticism is called for, then we would say that he might have omitted his first two chapters dealing with the formation and constitution of coal. Undoubtedly there is a very intimate relation between coal and tar, but we imagine that the average tar distiller has little interest in the abstruse theories connected with a substance with which he rarely deals himself.

In the main, crude coal tar is primarily treated for the separation of benzoles, naphthas, creosotes, naphthalene, anthracene, carbolic and cresylic acids, pyridine, and pitch. As would be expected, the author gives chief attention to these products, but he does not neglect to deal quite fully with some of the more uncommon products. Coal tar is, of course, an extremely complex mixture of chemical compounds, chiefly of the aromatic series, and the manner in which it is prepared, together with the nature of the raw material, influences to a wide extent its chemical composition and physical properties. It is supposed that high-temperature tars contain 210 or more definite chemical compounds, and from the distillates and pitch obtained when these tars are submitted to the process of destructive distillation about 120 of these compounds have been definitely isolated. It is an interesting fact to notice that the tar distiller has an undoubted preference for the benzenoid tars, for when dealing with these he is sure of a proper and uncontaminated yield of benzene and toluene. For this reason he will not prove too enthusiastic about the modern plant (vertical retorts) which is gaining favour among coal carbonisers, for with such plant the passage of the evolved gases and vapours from the retort precludes any material effect in the way of degradation, the result being that a distinctly paraffinoid tar is yielded. Again, it is interesting to learn that even coke-oven tar is decidedly paraffinoid—a fact which, when consideration is given to the carbonising vessel, would not altogether be suspected. In by-product coking, however, it is now the usual practice to employ crushed coal in fully-charged ovens working at high temperatures, and this procedure keeps the paraffins content of the tar on the low side.

Emphasis should be laid on the fact that Mr. Warnes does not solely confine himself to coal tars, for all those related substances capable of yielding to the same treatment come under his notice. It is obvious that an immense amount of work has been put into the volume, which also deserves mention as admirable from the point of view of printing and general presentation. C. A.

VARNISHES AND THEIR COMPONENTS. By Robert Selby Morrell, M.A., Ph.D., F.I.C. Oxford Technical Publications. Henry Frowde and Hodder and Stoughton, 1923. pp. xii+362. 25s.

During recent years much valuable research work has been carried out not only in this country but also in America and Germany on varnishes and their components, but the results of these researches are too often to be found only by a laborious search through technical journals and the reports of various chemical societies. In this book Dr. Morrell has attempted to present a clear and concise summary of all the recent advances in the study of varnishes and their compounds, and it can be said at once that he has succeeded admirably. Dr. Morrell does not give, and does not profess to give, detailed descriptions and recipes for the manufacture of varnishes such as are to be found in Livache's *Manufacture of Varnishes*, or Seeligmann and Zieke's *Handbuch der Lack und Firnis Industrie*, but the general principles on which these must be based are clearly set out and enumerated. The theoretical and laboratory side of the subject is, however, dealt with lucidly and comprehensively, and the book cannot fail to be of the greatest value both to students and to research chemists whose work is connected with this industry. The arrangement of the book is clear and logical. In Part I a general account is given of the various components. Their composition, characteristics, and sources are concisely but adequately described. In Part II the different types of varnishes are fully dealt with. In an illuminating chapter Dr. Morrell deals with the causes of various defects which so frequently occur in varnishes, and he indicates different methods of prevention. Of particular value is his discussion of the problems of viscosity and elasticity. His treatment of the "Catalytic Oxidation of Oils by Driers" and "Insulating Varnishes" includes a summary of all the most recent work published on these subjects, and without being exhaustive will be found of great interest and value.

A special feature of the book is the large number of references to original papers which are given at the end of each chapter, and which should prove extremely valuable to all engaged in research work on this subject.

The book is well illustrated and remarkably free from typographical errors. It contains an excellent Index and Bibliography, and can be warmly recommended to all engaged in the scientific development of the industry.

J. GAULD BEARN.

CHEMISTRY, APPLIED TO HOME AND COMMUNITY. By Pauline G. Beery, A.M. Philadelphia and London: J. B. Lippincott Co. Pp. 534. 15s.

This is a book which will be read with interest both by anyone with a first knowledge of chemistry and by practising chemists. It is intended to provide a course of applied chemistry for women students that they may be enabled to undertake the task of selecting between the number of factory-made commodities which are necessary in our modern domestic life. Consequently we find the subjects dealt with include the chemistry of fires and fire-extinguishers, cleaning and polishing agents, stain removal, dyes, textiles, paper, paints, varnishes, pottery, toilet preparations, drugs, foods and the chemical changes involved in cooking. How many chemists can truthfully say that they have a knowledge of all these things, or how many can say, off-hand, what chemical changes occur in the cooking of the domestic cabbage? The book should also prove useful to those devising applied chemistry courses in schools, as a number of interesting laboratory experiments are suggested. A somewhat irritating feature for the general reader is the number of problems interspersed through the text, and the directions to certain experiments which conclude with the expression "result?" The chemist who lends the book to his friends should be aware of this or his reputation may suffer. The book, however, is interesting and instructive, and its originality and the broadness of its scope outweigh its faults. Being an American work some of the spelling is strange to English eyes, although the more offensive forms are absent. The term vitamin is graced with the final unnecessary and confusing "e," which the publishers would do well to remove from subsequent editions. Altogether it is well worth buying, and its publicity value for the chemical industries and the work of the chemist is very high.

Railway Rates for Chemicals

Concessions in the New Year

For some time past efforts have been made by the Association of British Chemical Manufacturers to induce the railway companies to consent to some modification of rates respecting certain chemical products. There are two kinds of rates in force at the present time—namely, one class which affects the maximum amount the railway companies may charge, and another section involving an exceptional rate which is below the class rate and is given for the purpose of attracting traffic to the railways and also to enable traders and manufacturers at different distances from their market to do their business in a satisfactory manner.

The general railway classification of goods shows that there are about 60 million exceptional rates at the present time. The intention conveyed in Section 36 of the Railways Act of 1921 really is to wipe out as many of these as possible, and for that reason under the new classification the number of classes has been extended. In many instances chemical commodities have had reduced classifications which will, it is expected, abolish a large number of exceptional rates now in operation, and there is good ground to state that the new rates will be below or very near the exceptional rates now charged.

The Provision which Controls the Rates

Section 36 of the Railway Rates Act of 1921, as at present drafted, is, in the opinion of chemical manufacturers and traders, practically unworkable, and during the last six months the Association of British Chemical Manufacturers have been negotiating with the railway companies with the object of finding an easy method of overcoming the difficulties in its application.

The section provides that on an "appointed day" all exceptional charges should cease to operate with the exception of such rates as: (*a*) Are not less than 5 per cent. below the standard rates which would otherwise on and from the appointed day become chargeable; and (*b*) have been continued by agreement in writing between the railway company and the trader concerned, or, failing agreement, had been notified in writing to the secretary of the railway company by the trader with a request that they should be referred to the rates tribunal.

This means in effect that no rate which has not been applied to the charging of merchandise actually forwarded within two years preceding January 1, 1923, should be continued unless the trader could prove to the satisfaction of the railway company—or to the satisfaction of the rates tribunal—that its non-application was solely due to abnormal conditions of trade; or that a rate of equal amount to the same destination remained in operation at other stations or sidings in the same group or area, provided that if the trader and the railway company agreed to continue any rate which would be more than 40 per cent. below the standard rate chargeable the rate should, on the appointed day, be referred to the rates tribunal. Any such agreement might provide for the continuance of any exceptional rate at the same or any higher figure, not being, in the case of an agreement between a railway company and a trader, less than 5 per cent. or more than 40 per cent. below the standard rate chargeable and for a specific period of time.

A Modification Scheme

The outcome of the negotiations for the modification of the above provisions was a scheme under which Section 36 of the Act of 1921 can, it is believed, be more easily and effectively worked.

According to the suggested arrangement the "appointed day" is January 1, 1926. Existing exceptional rates are to be continued—subject to any modifications under Section 60, dhich must come into operation before the "appointed way"—up to December 31, 1925.

Between January 1, 1924, and December 31, 1925, the railway companies will make a record of all exceptional rates used during that period. The records will be submitted by station authorities to headquarters for examination at regular intervals, and as soon as the standard charges are fixed by the tribunal and the revised distances ascertained, the necessary comparisons will be made by the railway companies.

The rates so recorded will be available for inspection by traders at the stations in one or other of the following ways:—

(*a*) Rates used up to July 31, 1925, which the railway companies propose to continue without modification after the "appointed day" will be published in new rate books, which will be available for inspection by September 30, 1925. If it is not found possible to publish the new rate books by that date the Traders' Co-ordinating Committee reserves the right of applying for such postponement of the appointed day as may be necessary. Any rate not included in those rate books which a trader desires to retain must be notified by him in writing to the secretary of the company concerned, with a request that they shall be referred to the Railway Rates Tribunal for determination by them, such notification to be made as early as possible, but not later than December 31, 1925. Failing agreement, these and other rates then will be referred to the tribunal and will continue in operation pending their decision. Additional rates used between August 1 and December 31, 1925, will be dealt with similarly.

(*b*) Rates which the railway companies considered should be adjusted will be specially recorded and published at the railway stations in separate forms as early as possible, but not later than September 30, 1925.

Essential Factors for Retention of Rates

One of the essential factors necessary to secure the retention of the existing exceptional rates is that at some time during the two years ending December 31, 1925, a rate will have to be actually charged on traffic passing during that period. Further, the trader is advised that, in order fully to protect his position, he should keep a record showing the rate used and the date on which traffic passed.

The railway companies' claims to dangerous goods are not classified, and that the rate they fix is the reasonable sum they are entitled to charge under Part IV. of the Rates and Charges Orders Confirmation Acts 1891 and 1892. After the "appointed day" the situation will be changed, and dangerous goods will be classified in precisely the same manner as ordinary merchandise. It may therefore happen that the proposed standard charges may give higher rates for certain classes of goods than are now paid, and to preserve the position the Association of British Chemical Manufacturers is in negotiation with the railway companies to record the rates charged on dangerous goods as exceptional rates.

Alkali Works Inspection

At a joint meeting of the Bristol Sections of the Society of Chemical Industry of the Institute of Chemistry last week, Mr. R. D. Littlefield, F.I.C., South Western District Inspector under the Alkali Act, and chairman of the Bristol and South-Western Counties Section of the Institute of Chemistry, gave an address on "Some reminiscences of an Alkali Works Inspector." The address, which was in a racy vein, indicated a wide and varied career in many branches of chemistry, and earlier in pharmacy. A number of references were made of the speaker's association with Professor, afterwards Sir William, Ramsay, as a student, as a colleague, and as a friend. It was of local interest to note that Professor Ramsay's first Chair of Chemistry was at University College, Bristol. An interesting account of various experiences in commercial chemistry in association with Sir William Ramsay was given. Investigations were described in connection with the Sewage Disposal Commission, dealing with the refuse waste liquors from Scottish distilleries, which involved a close study of aquatic vegetation, definitely polluted streams, and incidentally the hatching and rearing of salmon in natural and unnatural conditions. The address concluded with a strong appeal for co-operation between manufacturers in associated industries, so that their ultimate aim would be that British products should be the best in the world because they were British made.

New Science Buildings at Bangor

The erection of the new science buildings at Bangor University College is about to be begun. The extensions will consist of five new blocks of buildings, estimated to cost £70,000. Agriculture will occupy the greater part of the buildings, which will include one of the most completely equipped agricultural chemistry research departments in the country.

Scientific Novelties Exhibition

Second Year at King's College, London

DR. ALEXANDER RUSSELL, president both of the Institute of Electrical Engineers and of the Physical Society of London, on Saturday afternoon, December 29, opened the second Scientific Novelties Exhibition in aid of King Edward's Hospital Fund for London at King's College, where it is being held until January 9, by permission of the Delegacy. Senator Marconi was to have performed the ceremony, but was detained in Italy. He wired to wish the exhibition every success. Professor Winifred Cullis presided. Last year as a result of the exhibition £2,000 was raised for King Edward's Hospital Fund.

The object of the exhibition is to instruct and entertain, and, being held in the Christmas holidays, it secures a large attendance from the younger generation. The exhibits cover all branches of science, and in view of the success which has attended this and previous exhibitions the publicity for all scientific industries concerned is very valuable. There are a number of special demonstrations of an attractive nature dealing with such subjects as X-rays, cathode rays, high tension discharges, and similar matters which are always sure of taking the public fancy.

Chemical Lectures and Exhibits

The chemical section, arranged by Mr. W. E. Garner contains a number of attractive exhibits, not always purely chemical. For instance, there is a demonstration of bubble blowing in which large soap bubbles containing a mixture of air and coal gas float gently to the ceiling. Of a more serious nature is a demonstration of the catalytic oxidation of ammonia, in which the platinum catalyst is maintained at white heat by the energy of the reaction. Small laboratory types of centrifuges are shown by Messrs. John Griffen and Sons, and the now well-known stream-line filter invented by Dr. Hele Shaw is also demonstrated. In another room there is a demonstration of glass blowing by Messrs. Duroglass, Ltd. One of the chemical demonstrations which always attracts a crowd demonstrates the nature of flame and explosive mixtures.

A number of informal public lectures are given each day, the subjects of which have included up to the present:—"New Uses of Silica in Industry," by Professor E. C. Williams; "Flame," by Professor Arthur Smithells; "Atoms and Electrons," by Professor E. N. daC. Andrade; "Liquid Air," by Mr. J. A. Philpot; "Petroleum in the Service of Man," by Professor J. S. S. Brame; and "The Fuel of the Future," by Mr. F. W. Goodenough. Further lectures are to be given, including "Radium and X-Rays," by Professor Sidney L. Ross, on Monday, January 7, at 3.15 and 7.15 p.m.; "Liquid Air," by Mr. W. E. Garner, on the same day at 4.15 and 8.15 p.m.; and "Science and Progress," by Sir Richard Gregory, on Wednesday, January 9, at 3.15 and 7.15 p.m.

The organisers of the exhibition are to be most sincerely congratulated for arranging such an attractive series of demonstrations, lectures and exhibits covering the interesting features of electricity, engineering, archæology, physiology, biology, geology, chemistry, physics and scientific theology.

The Use of Colloidal Silica

In his lecture on "A New Use for Silica in Industry," Professor E. C. Williams drew attention to a new industrial application of silica which presents an interesting example of how a phenomenon of purely scientific interest might become of considerable commercial value. "It is possible," he said, "by suitable methods of preparation to obtain silica in the form of a highly porous sponge-like structure, in which the pores are so minute as to be invisible, not only under the microscope but also under the ultra-microscope. Silica in this form is to all outward appearances a hard granular substance, like fragments of clear transparent glass or quartz, though actually more than half its internal volume may be made up of air channels. One result of this enormous development of surface and of capillary channels is that silica in this special form is able to condense within itself, vapours existing in the atmosphere around it, or to absorb selectively certain contituents of solutions in which it may be placed.

"These properties place this colloidal form of silica in the same category as active charcoal, which proved invaluable during the war as a filling for gas masks for the removal of poisonous gases from air. Although not equal in absorbing power to some of the most active forms of charcoal, colloidal silica possesses a distinct advantage over charcoal for many industrial purposes, since it is far more resistant to the chemical and physical actions which an industrial absorbent may be called upon to withstand. The possible industrial applications of such an absorbent are legion, and include both the recovery of valuable vapours from air or gases which contain them in very small dilution, or the removal of abnoxious vapours from foul air passing to the atmosphere. Ether, alcohol, acetone, benzene and petrol vapours, as well as oxides of nitrogen and sulphur, may be recovered in this way, and it is probable that many recovery processes now economically impossible will become commercially profitable. Another direction in which the use of colloidal silica appears likely to be of great value is in the selective absorption of dissolved impurities from such liquids as crude petroleum oils, motor spirit, and waxes. This would be a method far less destructive of valuable material than the present methods of refining."

The lecture was illustrated by experiments showing the actual preparation of the colloidal silica, the complete removal of hydrocarbon vapours from gas, and the refining of a crude petroleum oil.

Flame and Combustion

Professor Arthur Smithells in his lecture on "Flame" illustrated by experiments how gas, after mixing with air, on issuing from a tube, gave a flame that consisted of a single hollow cone. If, on the other hand, enough air were mixed with the gas for complete combustion the flame would travel against the stream unless the latter was moving rapidly, as in the case of the blowpipe flame. Demonstrations were given of floating lights in a tube, and by "chloroforming" the flame, as the lecturer described it, the lights changed in colours of red, blue and green. By the kindness of the Gas Light and Coke Co. there was installed a small gas stove and a series of incandescent gas lights. With these Professor Smithells illustrated how gas appliances for cooking, giving warmth or light, could be efficiently and economically utilised. The audience were evidently extremely interested in the experiments.

Exhibition of Scientific Apparatus

Points of Physico-Chemical Interest

THE fourteenth annual exhibition of apparatus by the Physical Society of London and the Optical Society was held at the Royal College of Science, South Kensington, London, on Wednesday afternoon and again on Thursday. The rooms of the physical laboratories were used, a large space being available for displays arranged by the principal manufacturers of scientific instruments. Though, as might be expected, the greater part of the exhibits consisted of electrical and optical apparatus, there were a number of items of physico-chemical interest. The whole of the arrangements were admirably carried out, details such as the posting of direction notices being particularly good, especially in view of the short period the exhibition was open. Only members of the Physical and Optical Societies and invited guests were admitted. It was, however, very well attended.

Description of Exhibits

Among the individual exhibits must be mentioned that of the Damard Laquer Co., Ltd., of Birmingham, which consisted of a fine display of "Bakelite" insulating material in various forms, such as cements, enamels, varnishes, etc., and worked up into various fancy articles. The same firm also showed an interesting exhibit of acid-resisting lacquers applied to scientific instruments.

Evershed and Vignoles, Ltd., in addition to exhibiting a number of interesting electrical instruments, including the "Meg" insulation tester, showed the "Dionic" water tester for determining rapidly the amount of inorganic impurity dissolved in water, which is claimed to be a much more practical method than chemical analysis. The new constant pressure "Meg" insulation tester was also shown. This is a new introduction which combines the advantages of a constant

pressure generator with the qualities of light weight and compactness, which are a marked feature of the variable pressure instrument. The addition of a constant pressure clutch enables circuits having considerable electrostatic capacity to be tested, whilst the risk of damaging insulation by excessive pressure is eliminated.

A. Gallenkamp and Co., Ltd., of Sun Street, Finsbury, London, exhibited an electrometric titration apparatus, consisting of a set of apparatus, comprising a stand-carrying burette, calomel and hydrogen electrodes, a beaker on a rising table support, a reservoir for KCl solution, a variable speed friction-driven stirrer and electric motor. This can be used for hydrogen ion concentration determination, or the preparation of accurately neutral or buffer solutions. In acid-alkali titration it gives a true end-point, regardless of the presence of colour, turbidity, precipitates, complex salts, weak acids or bases. In addition, electrically heated laboratory furnaces of various forms were shown, and also numerous other examples of laboratory apparatus.

Pyrometers are exhibited by several firms, including the Foster Instrument Co., of Letchworth, and Siemens Brothers and Co., Ltd., of Woolwich. The last-named showed in actual operation an optical pyrometer for measuring temperatures up to 2,400° C. The heated object whose temperature is to be measured is observed through a telescope and its brightness is compared with that of a standardised electric lamp, fitted inside the telescope. The temperature of the lamp varies with the current passed through it. This is measured by an ammeter, and the corresponding temperature is read on a specially calibrated scale.

Mention must also be made of an interesting temperature control apparatus by George Kent, Ltd., of High Holborn, London. The object of this apparatus is to close down the supply of steam to a dye vat or other similar vessel directly the liquid in the vessel comes to the boil, but at the same time to leave sufficient steam passing to keep the liquid in the vessel "on the boil." Automatic temperature control apparatus for a gas-fired furnace is shown also by the Cambridge and Paul Instrument Co., in conjunction with Radiation Ltd.

There is not space more than to mention many other interesting exhibits which included examples of chemical balances by such firms as Oertling, wave-length spectrometers by Adam Hilger, an acid resisting bomb-calorimeter by John Griffen, optical instruments by R. and J. Beck, and C. Baker, and innumerable electrical appliances.

Mineral Exhibits at Wembley

In connection with the British Empire Exhibition, the Imperial Mineral Resources Bureau, 2, Queen Anne's Gate Buildings, Dartmouth Street, London, S.W.1, has in preparation a descriptive handbook and guide in which reference will be made to mineral and metallurgical exhibits. Under each mineral or metal references will be made in this guide to those firms who are known to be showing raw materials and semi-manufactured products of the mineral and metal industries. It is desired that all firms proposing to exhibit materials likely to come within the scope of the handbook will communicate to the Bureau the exact nature of their exhibit, so that it may be considered for the purpose of cross-reference. It is requested that, where possible, an analysis and the source of the material be stated. The Bureau cannot accept any responsibility for any omissions from the handbook, but will endeavour to include references to all firms exhibiting crude mineral and semi-manufactured products, if information as to the exhibits is received at the Bureau not later than March 1, 1924.

Recent Wills

Dr. John Allen Harker, of Alston, Kings Road, Teddington, Middlesex, formerly director of research at the Ministry of Munitions, and chief assistant at the National Physical Laboratory	£6,739
Mr. Charles James Wild, 18, Ashwin Street, Dalston Junction, London, N.E., chairman of Reeves and Sons, Ltd., artists' colour manufacturers	£10,219

Dyeing of Cellulose-Acetate Silk

Results of Recent Research

A meeting of the Manchester Section of the Society of Dyers and Colourists was held on December 21, Mr. William Marshall, F.I.C., in the chair.

In a paper on "The Dyeing of Cellulose-Acetate Silk," Mr. L. G. Lawrie, A.I.C., said that the introduction of a new artificial silk possessing quite different dyeing properties from the other commercial fibres was an event of sufficiently rare occurrence to excite considerable interest among those connected with dyeing and textiles. This artificial silk—cellulose-acetate silk—had been the subject of a very considerable amount of research work, and whilst only two or three years ago it was with the greatest difficulty that a limited range of colours could be dyed on this material, excluding the dyeing of the saponified silk, at the present time there were quite a number of distinct methods of dyeing it, and the introduction of this artificial silk had already given rise both to a new series of dyestuffs and to new dyeing methods.

Characteristics of the Fibre

This fibre differed in many important respects from the other artificial silks in its behaviour towards the various chemical agents used in the dyehouse. With caustic alkalis the silk was saponified, the acetyl groups of the cellulose-acetate molecule being replaced by hydroxyl groups giving a modified form of cellulose. The silk so treated was then capable of being dyed with direct, vat, or sulphur colours in a similar manner to cotton or viscose. This saponification resulted, however, in a loss in weight of the silk, which was a considerable disadvantage from a practical point of view. Cellulose-acetate silk was very sensitive to hot water at a temperature of 90° C. or higher, when the silk shrank and lost its lustre, so that it was always dyed at a low temperature of about 75° C. This fibre was also very resistant to wetting out, and it absorbed water more slowly and to a less extent than either cotton or viscose. Another characteristic property of the silk was its solubility in organic solvents, such as acetone, pyridine, etc., and it swelled up and formed a jelly with chloroform. The other main chemical reactions of this fibre were very similar to those of cellulose.

The first attempts at dyeing this silk were by the utilisation of those dyestuffs already on the market. It was then seen that the silk had a noticeable affinity for dyestuffs of a basic character, and little or no affinity for dyestuffs containing sulphonic acid groups. Dyeing with basic colours, or with the few acid and chrome colours having an affinity, soon gave place to dyeing with the bases themselves, first as their hydrochlorides and latterly as the free bases by precipitation with alkali for which the acetate silk had a very marked affinity. By diazotising and developing these bases on the fibre a much increased range of shades was available. A considerable improvement was made when Professor Green discovered that by the conversion of these bases to their omega sulphonic acids, as with the ionamines, they were rendered soluble, but capable of easy dissociation in the dye-bath with the regeneration of the base from which they were prepared, which was instantly taken up by the fibre.

Dispersion Dyeing

A considerable step forward was made when it was found by the British Celanese Company that certain colours, simple amidoazo bodies, etc., could be "dissolved" by heating with such substances as Turkey red oil, sulphonated ricinoleic acid, and many other colloidal bodies. The resulting mixture poured into water gave what appeared to be a true colour solution but was in reality a highly dispersed colloidal state. Such dispersed colours were found to dye the silk well, and this method, which could be called, for want of a better name, "dispersion dyeing," was capable of a very extended use. Other colours could be used by this method such as Spirit Yellow I, Quinoline Yellow Base, Indophenol, etc., as well as such bases as dianisidine, tolidine, benzidine, etc., which were taken up readily and could be diazotised and developed on the fibre. The range of these Dispersol Colours had been recently extended by the very important addition of red, violet and blue amidoanthraquinone dyestuffs by the British Dyestuffs Corporation, thus giving an almost complete range

of colours possessing excellent fastness to light. This series of compounds had at the same time been used in the production of similar ionamine dyestuffs.

Attacking the dyeing problem from a different point of view, the British Dyestuffs Corporation patented the use of amidoazo bodies, etc., rendered soluble by the introduction of carboxylic acid groups, which compounds also had a considerable affinity for cellulose-acetate silk. Still another method of overcoming the lack of affinity of those dyestuffs containing sulphonic acid groups was by altering the position of the sulphonic acid group in the dyestuff molecule, when, in certain positions, considerably increased affinity was obtained.

The dyeing of union materials of cotton and cellulose-acetate could be easily accomplished, as the majority of direct cotton colours had no affinity for the acetate silk and most of the cellulose-acetate colours had no affinity for cotton. By a judicious selection of suitable colours either solid shades or contrast effects could be obtained by a one-bath process. The dyeing of wool and cellulose-acetate mixtures was a more difficult process, as practically all the dyestuffs capable of dyeing acetate silk also dyed the wool, and usually dyed it a different shade. There were, however, certain colours which dyed both the wool and the silk the same shade. Cellulose-acetate could be readily printed with direct, vat, and sulphur colours by the addition of caustic soda to the printing paste, which produces a slight but sufficient superficial saponification of the silk, which allowed of the colours being fixed on the fibre.

At the conclusion of the lecture a number of photomicrographic lantern slides were shown, most of them being sections of the dyed material showing the penetration, etc., of the dyestuff.

Sampling Oil for Analysis

The notes below, which were written by Mr. Charles V. Bacon, a well-known American analyst, describe the methods which have been found most suitable in taking samples of China Wood Oil for analysis. The conclusions apply very largely to the general problem of sampling oils and similar substances.

THE proper sampling of china wood oil is even more important than the analysis. It is an easier matter to analyse wood oil properly than to secure a representative sample, yet, unfortunately, this very important factor is overlooked by the major portion of the buyers. Some years ago the writer examined some two thousand individual barrels, alleged to be a uniform shipment. The results of this work disclosed pure oil and oil adulterated as high as 25 per cent., while there was also found some barrels that contained no wood oil, but tea seed, tallow seed, and peanut oils. While the tanking of oil has greatly increased the uniformity of arrivals, there are even to-day some arrivals that are not uniform. Recently an examination of eighteen individual barrels, all alleged to be uniform, disclosed that only five barrels were pure, two contained an excessive amount of foots, and the balance were adulterated from 3 to 8 per cent.

There seems to be a very decided tendency to under sample and improperly sample in the trade. This is no doubt occasioned by what may be termed as false economy, as sampling, like everything else, takes time, and requires certain experience and care which cannot be secured unless given the requisite time, which, quite naturally, adds to the charges. The writer has made it his business to be present on the docks and observe methods of sampling, and unfortunately has witnessed conditions that are short of criminal. The so-called sampler proceeds to drive out the bung, rolls a newspaper, sticks it in the bung-hole, tilts the barrel and fills possibly three cans, then he takes another barrel, goes through the same procedure, and fills another three cans. These six samples from two different barrels, which may not be the same, are then tendered as a representative sample of three or four hundred barrels. One requires no technical training to appreciate that this procedure is absolutely unfair to everybody. The samples are not the same, they are not representative of the arrival, and pouring the oil from the bung amounts to racking off the clear oil, and the sample will always be clear and invariably bright.

Correct Method of Sampling

If the oil in barrels or drums is to be properly sampled, there are two factors that must be given due consideration. First, the sample must be drawn from at least 10 per cent. of the packages well distributed; second, the method of drawing the sample must be such that you secure material that is representative of both the top and the bottom. If the oil is liquid, the proper way to do this is by means of thief, which is a cylindrical glass tube about 1½ in. in diameter and sufficiently long to reach the bottom of the barrel, the lower and upper end is constricted, underneath the latter there is a brass band holding two rings through which you insert your fingers. The thief is gradually lowered through the bung-hole until it strikes the bottom of the barrel (by doing this you secure a core of the oil); the tumb is now used to close the top opening and prevent the oil from running out of the thief when withdrawn. Samples taken in this manner should be composited into one large container and the number of each barrel recorded and so stated on the sampling certificate, which will enable the purchaser or seller to check the material in event of a dispute. During the winter, when the oil is very often in a solid condition, the same procedure should be followed, replacing the thief with a tallow trier, which is essentially a graduated piece of steel tubing semi-circular in form and about 3 ft. long; this is pushed into the oil, turned a few times and withdrawn, taking out a solid core of oil.

During the last two years a very large amount of china wood oil has been imported from the Orient in bulk; this oil is generally loaded into a deep tank on regular freight-carrying vessels at Shanghai, the quantity varies, ranging from 400 to 1,000 tons. The writer has sampled bulk cargoes in excess of a 100,000 tons, and in no instance knows of any complaint. The procedure followed is to first draw samples from the top and bottom of both port and starboard sections of the tank. These samples are visually examined, and if the general appearance gives indications that the oil is all right, pumping is started and samples are drawn from a bleeder in the discharge line every thirty minutes. These individual samples are composited to make one uniform sample representative of the entire cargo.

The analysis is generally based on the bleeder sample, although many shippers also have the tank cars into which bulk cargo is to be loaded also sampled. This is usually done as an additional precaution in the event of any dispute arising relative to a specific tank car. It should also be noted that in all instances the sample drawn shall be of sufficient quantity to enable the same to be distributed as the owner of the commodity may direct. If the sample of the goods is delivered to the owner, as covered by instructions, it should also be under seal. In any event, all samples should be held intact for a period of three months.

If the purchasers of china wood oil will insist upon the aforesaid procedure when they are buying oil they will better protect their interests and be in a position to readily detect any different analysis.

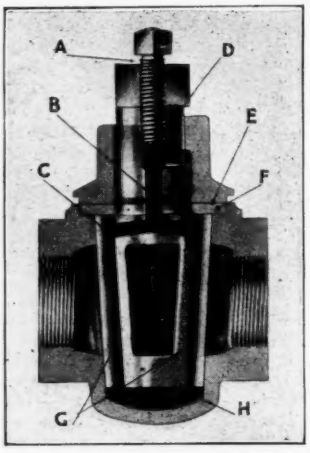
Chemical and Dyestuffs Traders' Report

THE British Chemical and Dyestuffs Traders' Association have issued an annual report dealing with the activities of the past year. These are practically covered in the summary published in THE CHEMICAL AGE of December 29, and were mainly concerned with assisting members in their difficulties with the operation of the Dyestuffs and Safeguarding Acts. Increasing use is being made by members of the facilities in this direction, and the report contains an appeal to traders in the event of any difficulty with government departments to refer the matter to the association. It is stated that formaldehyde was removed from the list of fine chemicals liable to duty under the Safeguarding of Industries Act, and in addition the important precedent was established by a test case that such alterations in duty should be operative from the date of the award, instead of some date arbitrarily fixed by the Board of Trade. The practice introduced by the Customs of refusing to accept the foreign exporter's valuation of imported goods in all cases was questioned, and a concession gained pending further consideration. Arrangements are well in hand for a system of bonding of goods for re-export, which at present come under the Safeguarding Act. In addition to these matters, members have been kept posted of all changes likely to affect the interests of the chemical and dyestuffs trade.

A Non-Sticking Valve for Chemical Work

Seating Composed of Special Lubricant

A VALVE of some interest to chemical engineers is now being manufactured in this country under licence from an American concern, which is remarkable from the fact that the working seat is solid lubricant of such a composition as to resist the action of the liquid in the pipes, and which is renewable at will without in any way disturbing the continuity of operation of the plant upon which it is installed. The general design of the valve is on the lines of the Plug Cock, but introduced into the shank of the plug is a container for holding a supply of solid lubricant in the form of a cartridge. This lubricant is forced down by a screw past a ball valve in the bottom of the chamber through ducts to grooves on the exterior of the plug down to another chamber at the base of the body, which in turn becomes filled with the lubricant. On the top of the plug is placed a thin ring of metal carrying a washer of asbestos, which is again firmly held between the body and the gland by strong bolts.



THE MERCO VALVE

A. Lubrication Screw
B. Lubricant Reservoir in Stem
C. Branch Ducts to Outside
D. 90° Stop
E. Asbestos Packing
F. Brass Washer
G. Lubricant Grooves to Chamber
H. Lubricant Chamber

When the screw of the top lubricant chamber is turned to exert pressure upon the lubricant, this is naturally transferred through the ducts and grooves to the chamber at the bottom of the valve where the lubricant, being plastic, exerts an upward pressure on the plug compressing the asbestos joint and lifting the plug slightly off its seat. In this condition the lubricant is standing slightly proud of the surface of the plug, and upon revolving this in the body the whole of the interior is covered with a uniform film of the lubricant, isolating the metal surfaces from each other and the fluid in the pipe line. A 90 degree stop is provided on the shank of the plug so that the vertical grooves carrying the lubricant are never exposed to the port, and all possibility of the lubricant being blown out into the port area is eliminated. One of the features of the design of the valve is that there is a straight 100 per cent. port through it with no large spaces in which sediment can collect or heavy frictional losses occur through eddying of the fluid in odd corners or changing direction of flow.

A metallurgical and chemical laboratory has been established in New York for some time by the Merrill Company of San Francisco, and a staff of chemists devote their whole energies to the investigation of solid lubricant, metals, and other non-metallic materials, to enable these valves to meet any condition or service they may be called upon to perform. Six standard lubricants are available for use when handling different liquids or gases. Most of these contain graphite. For service where the presence of even small amounts of graphite is undesirable, for example, where food products are being handled, odourless, tasteless, colourless, non-injurious lubricants can be furnished.

The manufacturers in England are the Audley Engineering Co., of Newport, Salop, who emphasise strongly that owing to its design no matter how badly the plug in one of these valves may be stuck or "frozen," due to long disuse, a turn or two of the lubrication screw must lift the plug from its seat, and at the same time lubricate the bearing surfaces, so that the plug will then turn readily.

An Advantage of Pulverised Fuel

The Utilisation of Blast Furnace Gas

ONE of the interesting developments of to-day in the field of power generation is the strides now being made with the use of pulverised coal. From the chemical point of view, the firing of coal or other solid fuel in a very finely pulverised condition, such as, for example, 90 per cent. through a 100 mesh screen and 65 per cent. through a 200 mesh screen, has many advantages, the chief of which is the essential fact that combustion can be obtained, on the average, with only 20 per cent. excess air over the theoretical. This means an intensely hot flame, about 17–18 per cent. CO_2, entire absence of CO and unburned gas, and the maximum emission of radiant heat, so that, in fact, one of the problems of pulverised coal firing has long been the construction of furnaces to withstand the conditions.

Steam Generation

There seems to be no question, however, that the practical difficulties in connection with pulverised coal burning on a large scale have now been solved, especially as applied to steam generation, and the most characteristic invention in this connection is the water screen, as used on the "Lopulco" system. That is to say, the principle of having a series of water cooled steel tubes in the bottom part of the furnace to prevent the very serious property of slagging, the ash becoming molten because of the intense heat. Combined with this, however, the "Lopulco" system includes the principle of air cooled brickwork throughout in the furnace, whilst the resulting heated air—often as high as 500° F.—is used for the secondary air supply to the burners, 10 per cent. being used as a cold primary supply to convey the pulverised coal through the burners, and 90 per cent. added as heated secondary air to complete combustion.

The progress made in the United States since 1920 in the application of pulverised coal firing on steam boilers is remarkable, and from a total consumption of less than about 100,000 tons of coal per annum, the figure has risen to-day, on the "Lopulco" system, to 1,000,000 tons per annum, and when the present plants in course of erection are complete, within almost the next few months, the consumption is expected to jump up to over 3,000,000 tons per annum.

Difficulties Overcome

It has not yet been realised in Great Britain that one of the most striking advantages of pulverised coal is the fact that it enables blast furnace gas to be used under steam boilers to the highest efficiency, a problem which has hitherto defied solution until the erection of the River Rouge plant of the Ford Motor Co. at Dearborn, Detroit, in which normally 70 per cent. of blast furnace gas and 30 per cent. of pulverised coal on the "Lopulco" system is now being burnt without difficulty, the consumption of the gas being nearly 70,000,000 cubic ft. per 24 hours. In the first place, of course, blast furnace gas is a very low grade product, with an average calorific value of about 100 B.Th.U. per cubic foot, and a composition of, say, 24¾ per cent. carbon monoxide, 5¾ per cent. CO_2, 2½ per cent. hydrogen, ¾ per cent. methane and 66½ per cent. nitrogen. Other difficulties, however, are the violently fluctuating nature of the gas as turned out from the blast furnace, the average figure of which is something like 160,000 cubic ft. per ton of coke used, together with the fact that it is extremely dusty and dirty.

The present general method of endeavouring to burn this dirty gas under steam boilers, together with solid coal to help out the fluctuations, is a hopeless proposition from the point of view of adequate efficiency, as it is almost impossible for the amount of heat in a solid coal furnace, whether hand or mechanically operated, to be varied sufficiently quickly to correspond to the alterations in the volume of the gas. With pulverised coal, however, there is no difficulty at all, since this fuel can be controlled as quickly as the gas itself, and the great success of the River Rouge plant is now leading to various other concerns following suit in the United States.

The amount of blast furnace gas wasted in Great Britain is appalling to contemplate, and pulverised fuel firing would be a method of momentous importance if only considered from the point of view that it makes possible for the first time in Great Britain the efficient utilisation of all this blast furnace gas.

From Week to Week

NOBEL'S EXPLOSIVES COMPANY, LTD., have offered two prizes for pupils in the Saturday afternoon classes for miners in the Faculty of Engineering, Bristol University.

AMONG THE NEW YEAR HONOURS, Dr. Wyndham Dunstan, F.R.S., received the title of Knight Commander of the Order of St. Michael and St. George, for services as Director of the Imperial Institute.

JAMES WOOD (69), an analytical chemist of Liverpool, has died from carbolic poisoning. Dr. J. E. W. Macfall, who made the post-mortem examination, attributed death to cresol poisoning, but he did not know how it had arisen.

LONDON COAL was increased by one shilling per ton on Saturday, December 29, making a total advance for the month of two shillings. The increase, which is due to a shortage consequent upon heavy export trade, applies to all kinds of coal.

COMPAGNIE COMMERCIALE DU NORD (GREAT BRITAIN), LTD., 54, Gracechurch Street, London, E.C.3, announce that they have been appointed agents for the English Colonies, with the exception of Canada, for the well-known Vernière's make of Cream of Tartar, both 95 and 99 per cent. grades.

MR. J. C. URQUHART, analyst at the East Anglian Institute of Agriculture, Chelmsford, has been ill for some time, and Mr. R. P. Hawkins, Brentwood, has been appointed temporarily to the Chemical Department during Mr. Urquhart's absence. It is hoped that the latter will resume duty about Easter.

AT AN INQUEST held on the body of a workman who was gassed while cleaning the flues at the works of a company near Middlesbrough, the coroner commented on the fact that the flues had not been opened out before they were entered, as was customary, and warned a watchman, whose forgetfulness, it was alleged, was responsible for this.

DR. J. A. HANLEY, Lecturer in Agricultural Chemistry and Advisory Chemist in the University of Leeds, has been appointed Agricultural Information Officer in the University of Bristol, and Mr. Frank Tutin, Lecturer in Bio-chemistry in Bristol University and Bio-chemist to the Agricultural and Horticultural Research Station, has been awarded the Service Degree of M.Sc. (Bristol).

THE GAS COMMITTEE of Edinburgh Town Council have been considering the provision of additional gas manufacturing plant. The present retorts were put in when the station at Granton was built over twenty years ago, and while it is not proposed to supersede them, it has been found necessary, owing to increase in the consumption of gas, to make additions. It is understood that the scheme will cost over £200,000.

DR. WILLIAM ARTHUR BONE, Professor of Chemical Technology, Imperial College of Science and Technology, gave the first part of his lecture on " Fire and Explosions " on Wednesday. This was the Mann juvenile lecture, and was given at the Royal Society of Arts, London, and dealt with the early history of the chemistry of combustion from the time of Boyle to Priestly and Cavendish. An interesting series of experiments illustrated the lecture.

" DEATH FROM CANCER attributed to working in creosote " was the verdict registered by a Sunderland Coroner, at an inquest on Thomas Taylor, a workman, who died on Christmas Day. Taylor had complained for a long time of pains in the right hand, and six weeks ago it was found necessary to amputate his arm above the elbow. His condition did not improve and he died as a result of cancer, which the pathologist declared could be easily set up by his work at the L. and N.E.R. creosote works.

MR. ATHOLE G. ALLEN announces that, his agreement with Mr. Fl. Bourgeois having expired at the end of last year, he has commenced business as from January 1 for his own account as Athole G. Allen and Co., 604-605, Salisbury House, London Wall, London, E.C.2. The agency arrangements with the Stockton-on-Tees Chemical Works, Ltd., for the sale of their products and with Societe d'Electro Chimie, d'Electro Metallurgie et des Acieries Electrique d'Ugine of Paris for the sale of their anhydrous ammonia, have been transferred to him and will be carried on as formerly.

MAJOR T. S. IMPEY referred at a meeting of agriculturists at Nottingham on Saturday to a proposal to build a sugar-beet factory at Colwick in the immediate neighbourhood of the city. The directors are prominent men in the shipping trade in Glasgow. It would be necessary, he said, to obtain contracts next year for an area of 5,000 acres to supply the beet needed, giving an output of about 50,000 tons. The season following, double this quantity would be needed. Four big shipowners had agreed to find the capital for the company. The factory was to be completed next October.

DURING THE LAST six weeks, Meldrums, Ltd., of Timperley, near Manchester, state that they have supplied forced draught furnaces to two laundries, three gasworks (one a repeat order in Australia), a water works, a baths department, a chemical manufacturer, two collieries, a steelworks (puddling furnace), a leatherboard manufacturer, a timber works, a spinning and weaving mill (India, a repeat order), an engineer, a technical college, and a tar distillery, a total of 17 furnaces, to boilers of different types. In addition, six refuse destructors have been supplied to municipalities, hospitals and other users.

MR. C. L. HUISKING, head of the firm of Chas. L. Huisking, Inc., New York City, a well-known buying agency for the United States drug trade, has arranged to visit Europe in the early part of the New Year. It is understood that Mr. Huisking's intention is to visit the principal markets of Europe in connection with the interests represented by the various departments of his firm, which include chemicals, drugs, essential oils, and spices. While in Europe Mr. Huisking will make his headquarters at the office of the associate British house, Chas. L. Huisking, Ltd., 74, Great Tower Street, London.

SIR WILLIAM BRAGG lectured on Thursday, December 27, on " The Nature of Things " to a juvenile audience at the Royal Institution, London. As is customary at these lectures, there was a striking demonstration of experiments, which included on this occasion the working of an apparatus to show the path of the helium atoms resulting from radium, and an experiment to show the grouping of magnetised ping-pong balls floating in a tank of water when under the influence of a magnetic field. On Saturday, Professor Bragg dealt with " The Nature of Gases," and on Tuesday with " The Nature of Liquids."

OHLENSCHLAGER BROTHERS, of Shanghai House, Botolph Lane, London, E.C.3, announce that their business will for the future be carried on by Ohlenschlager Brothers, Ltd., a private company which has been registered for that purpose. The principal, Mr. Julius George Ohlenschlager, will act as chairman of the board, and will have associated with him as directors Mr. C. A. Garland, Mr. H. P. Coles, Mr. L. E. Harfeld, and Mr. G. T. Bell, who have been for many years with the firm. There will be no change in the general conduct and organisation of the business, and the existing contracts will be carried out by the company.

SIR MAX MUSPRATT, it is announced, has decided to withdraw for the present from the leadership of the National Liberals in the Liverpool City Council. For a year past Sir Max has given much time to preparing a scheme for abolishing war bonus payable to Corporation officials and reorganising the municipal staff on stabilised salaries. As the question is not a party one, and is not without difficulties of its own, he thinks he will be freer to deal with it in an independent position. Later in the year he expects to be absent from the city for some four months. He intends to visit Spain and Canada, and will be accompanied by Lady Muspratt.

WALTER WAUGH AND CO., of Coronation House, 4, Lloyd's Avenue, London, announce that the firm has been converted into a private limited liability company under the name of Walter Waugh and Co., Ltd., and that the business previously carried on by the firm will be, from January, taken over and conducted by the new company from the same address. All the partners in the firm will be directors, and there will be no change in the personnel or management of the business. Debts incurred before January 1 will be received and paid by the firm. All pending contracts will be taken over and completed by the company in due course.

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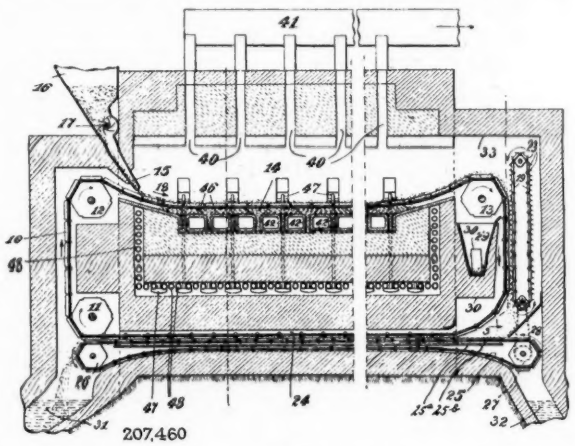
Abstracts of Complete Specifications

207,460. SOLID MATERIALS, APPARATUS FOR DISTILLATION OF. E. Piron, 275, Clinton Avenue, Brooklyn, New York; and V. Z. Caracristi, Bronxville, Westchester Co., N.Y., U.S.A. Application date, March 20, 1923.

The apparatus is for distilling solid material by heat conducted to it from a molten bath by the interposition between the material and the bath of a conveyor which conducts the heat from the bath to the material. An endless conveyor 10 passes over sprocket wheels 11, 12, 13, and over the surface of a molten bath 14. A bath of molten lead may be used for



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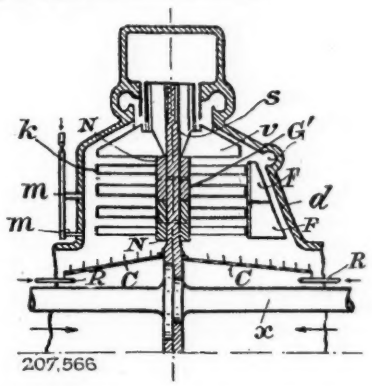
the destructive distillation of coal, and a bath of salt for the destructive distillation of wood. The conveyor must be of a material capable of floating on a molten bath. The material is supplied from a hopper 16 by a shoot 15 on to the conveyor, so that no part of it is in contact with the bath. The distillation of the material is effected by heat conducted from the bath, and the material is then disintegrated by chains or belts 19, having projections 23 which move parallel to the conveyor and at a different speed. The material is discharged on to another endless conveyor 25, which is arranged close to the return portion of the conveyor 10. The hot material is thus kept in contact with the latter to maintain the temperature of the conveyor. The material is finally discharged through a gas seal 31. The whole apparatus is enclosed in a casing 33, and the temperature of all the parts is thereby maintained. The bath is heated by tubes 42 passing through it, and cooling tubes 48 are also provided to prevent excessive transfer of heat from the hot bath to the conveyor 25. The vapour liberated from the material is discharged through conduits 40 to a common chamber 41, and the temperature is always kept below the cracking point of the distillation products, since the latter are drawn off without being subjected to a temperature above that of the hot bath.

207,566. CLEANING OR COOLING GASES OR OTHERWISE TREATING WITH LIQUIDS, APPARATUS FOR. M. Aurig and C. Brücklmayr, 25, Herschelstrasse, Munich, Germany. Application date, May 30, 1922.

This apparatus comprises a disintegrator combined with a fan. The rotating shaft *x* carries a disc *s*, a fan *v*, and removable rings G^1 on which rotary rings of vanes *k* are mounted. The vanes of adjacent rings are inclined in opposite directions, thus ensuring a change in the direction of the gas and liquid particles in passing from one ring to the next. The liquid is introduced through a pipe R into a cone C, which is slotted to distribute the liquid. To ensure that the whole surface of the vanes *k* is used for mixing the gas and liquid, some liquid is also injected into the casing through one or more tubes *m*. The jets of liquid are injected in the direction of rotation of the vanes, so that the rotation of the latter is assisted, thus economising power. To facilitate the cleaning of the apparatus, the supporting rings G^1 may be made in several parts N, each supporting one or more rings of vanes, which are thus detachable independently of the others. The action of the apparatus may be increased by providing vanes F on the casing. Several other arrangements of this apparatus based on similar principles are also described.



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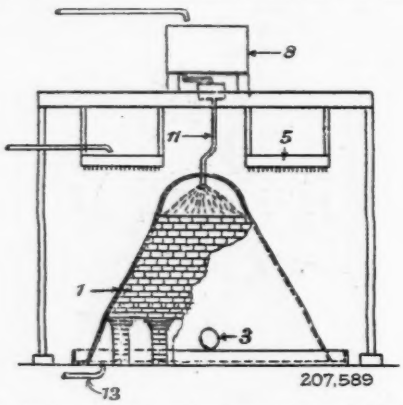
207,570. VULCANISED RUBBER AND SIMILAR MATERIALS, MANUFACTURE OF. W. J. Mellersh-Jackson, London. From Morgan and Wright, of corner of Jefferson and Belleview Avenues, Detroit, Mich., U.S.A. Application date, June 29, 1922.

As filling materials for indiarubber, charcoal, carbon black, lamp black, clays, metal hydroxides, whiting, colloidal substances, etc., have been used. It is now found that these filling materials may be treated in such a manner as to increase the tensile strength, resistance to abrasion, hardness, and toughness of the finished rubber product, while the time of vulcanisation may also be reduced. This preliminary treatment comprises the activation of the carbon by heating to 400°–1,200° C., or the colloidal clay by heating to 500°–1,000° C. A precipitated and partly dried metallic hydroxide or a partly dried gel, *e.g.*, silica gel, are activated similarly to the colloidal clay. The activation removes adhering impurities from the surfaces of the particles, so that they possess an adsorbtive capacity much greater than that of the unactivated material. In an example, a mixture of rubber 100 parts, sulphur 10 parts, and carbon black (activated by calcination at a temperature of 1,000° C. for 90 minutes), 36 parts, is vulcanised at 40 lb. steam pressure for three hours. The strength of the vulcanised rubber is about 13 per cent. higher than that of rubber containing unactivated carbon black. It has been found that there is a definite relation between the adsorption by activated carbon or clay, of malachite green and aniline dyes such as methylene blue, aniline violet, and aniline red, and the tensile strength of rubber obtained with such filling materials. There is also a direct relation between the amount of air given off by the carbon at 130°–135° C., and the tensile strength of the rubber, which increases with the amount of air given off. As a general rule, the strength of the rubber products is increased 5–15 per cent, the resistance to abrasion 20–60 per cent., and the time of vulcanisation is decreased about 25 per cent.

207,589. ACID PLANT EQUIPMENT. A. M. Fairlie, Southern Bank Building, Atlanta, Ga., U.S.A. Application date, August 25, 1922.

This apparatus is suitable for use (1) as a reaction and condensing chamber in the manufacture of sulphuric acid by nitration processes; (2) as an absorption tower for the recovery of oxides of nitrogen from the gases discharged from the condensing apparatus of a sulphuric acid plant; (3) as a condensing tower or chamber for the condensation of relatively weak sulphuric acid from the fumes discharged from the concentrating apparatus of a sulphuric acid plant. The wall of the chamber 1 is made of ordinary sheet lead, and the packing blocks inside the chamber are of polysided bricks. Gas is admitted at 3 and drawn off at the top, while water is sprayed over the outside of the chamber by sprayers 5. The liquid used for spraying the inside of the chamber is supplied from a tank 8 to a distributing pipe 11, and the liquid is drawn

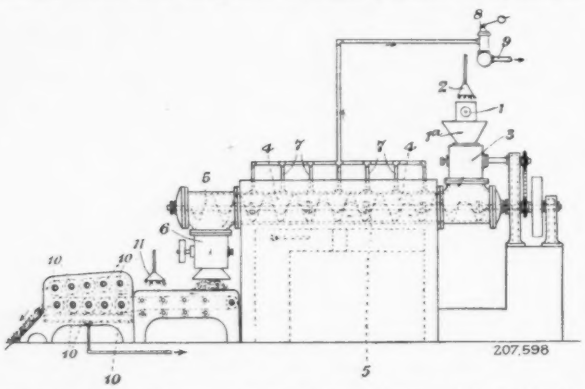
off at the bottoin by the pipe 13. This chamber may be as a substitute for non-packed lead chambers, reaction towers, or other devices for oxidising sulphur dioxide and converting the latter to sulphuric acid, or as a substitute for a Gay-Lussac tower. In the first instance, the apparatus is cooled internally with circulating acid, which may be either diluted or strengthened as desired before re-admission to the top of the tower. When used as a substitute for the Gay-Lussac



tower, the device is fed continuously with sulphuric acid of 60° Be., at a temperature below 120° F. A number of these towers may be used in series, the acid discharged from one tower being cooled and then fed to the top of another tower. In the manufacture of sulphuric acid by a catalytic process the device may be used for cooling and/or drying gases. The tower is made of a pyramid shape to facilitate the flow of cooling water over the outside, and also because the pile of filling blocks within maintains its stability and imposes no outward thrust on the lead walls of the chamber. Several alternative forms of the chamber 1 are also described.

207,598. CELLULOSE, PROCESS FOR TREATING MATERIALS CONTAINING. W. P. Perry, 19, Lytton Road, Leytonstone, London, E.11. Application date, August 28, 1922.

Cellulosic material—*e.g.*, wood, peat or the like—is treated without pulping by spraying with a catalyst, such as a mineral acid, and passing it through a tube containing a conveyor, during which it is subjected to steam pressure to hydrolyse

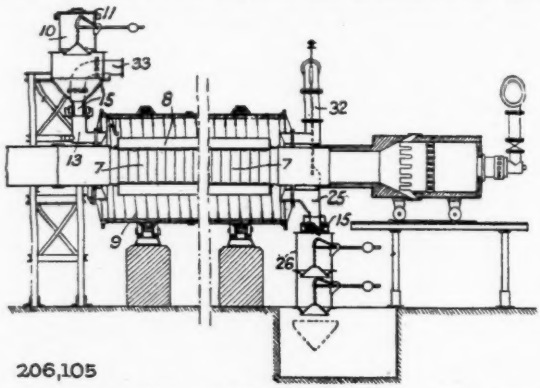


the material and recover certain by-products. The residue is then pressed to remove saccharine liquor and then distilled by means of hot gas. The material is supplied by a conveyor 1 to a hopper 1*a*, where it is treated with the acid from a sprayer 2. The material then passes through a gas-tight valve 3 to a hydrolyser 4 containing a screw conveyor 5. The tube is heated externally, so that the steam generated passes through the material. The action of the catalyst and the steam liberates furfural, guaiacol, and methy alcohol, which passes off with the steam through pipe 7, valve 8, and pipe 9, to the recovery plant. The continual removal of the furfural and other anti-ferments facilitates the ultimate fermentation of the saccharine liquor for ethyl alcohol. The residue passes through a gas-tight valve 6 to a conveyor, which is sprayed with a neutralising agent by a device 11, and thence through a series of pressing rollers 10. The material is then conveyed to a distilling producer, where it is distilled by contact with hot producer gas.

International Specifications not yet Accepted

206,105. ROTARY FURNACES AND RETORTS. E. Coppée and Co., 103, Boulevard de Waterloo, Brussels, and J. Kavan, 19, Karoliny Svetle, Prague. International Convention date, October 24, 1922.

The retort is for distilling fuel such as coal, peat, shale, or lignite. The material is fed through a hopper 10 to the furnace through which it is conveyed by a screw-blade 9. A central tube 7 rotates with the furnace and carries radial blades 8, which lift the material and maintain it in contact



with the whole of the periphery of the tube. Hot gases are passed through the tube in the opposite direction to the movement of the material, and the residue is discharged through a valved casing 26, in which it is quenched, while the steam is drawn off through a pipe 32. The distilled vapour is drawn off through a pipe 33.

206,121. CRACKING HYDROCARBONS. G. Gane, 2, Chaussée Kisselef, Bucharest. International Convention date, October 26, 1922.

Heavy hydrocarbons are heated under a pressure of 10 atmospheres, and temperature of 100°–700° C., and the vapour is brought into contact with a catalyst such as iron or copper. The yield of light hydrocarbons obtained on subsequent distillation is thus increased. Light hydrocarbons may be added to hydrogenate the vapour.

206,133-4. PERYLENE DYES. H. Pereira, 3, Treyung, Vienna, International Convention date, October 28, 1922.

206,133. Perylene quinone is treated with chlorine, yielding an addition product which, on treatment with agents fixing hydrochloric acid, is converted into a chloroperylene quinone. The perylene quinone may be suspended in nitrobenzene, and heated with chlorine and a trace of iodine. Light petroleum is added to precipitate the addition product, which may be recrystallised from nitrobenzene. The solution may be boiled with aniline to obtain chloroperylene quinone. This dyes cotton greenish yellow of a faster shade than that obtained with the addition product. 206,134. 4.4^{1}dioxy–1.1^1 dinaphthyl or its alkyl derivatives are heated with ring closing condensing agents in the presence of anhydrous alkalies such as sodium carbonate. The resulting 3.10-dioxyperylene is then oxidised, yielding 3.10-perylene-quinone. An example is given.

206,143. ORGANO-ARSENIC COMPOUNDS. Etablissements Poulenc Frères, 86, Rue Vieille du Temple, Paris, and C. Oechslin, 4, Rue des Noyers, Ablon, Seine-et-Oise, France. International Convention date, October 28, 1922.

Sodium arsenite is heated with an aliphatic compound $R-CHX-R^1$, where X is a halogen atom, R is a group such as CH_2OH, COOH, or $CH_2.AsO_3H_2$, and R^1 is a hydrogen atom or substitution group. Substituted aliphatic arsinic acids are obtained, and several examples are given.

206,150. NAPHTHOQUINONE DERIVATIVES. Soc. Anon. des Matieres Colorantes et Produits Chimiques de St. Denis, 105, Rue La Fayette, Paris, A. Wahl, 14*bis*, Boulevard Cotte, Enghien, Seine-et-Oise, France, and R. Lantz, 226, Rue La Fayette, Paris. International Convention date,

[*Continued on page* 19.]

[*Continued from page* 18]

October 28, 1922. Addition to 191,064. (See THE CHEMICAL AGE, Vol. VIII., p. 242.)

1-arylimino-2-naphthoquinones are obtained by the oxidation in alkaline solution by hypochlorites, peroxides, or oxygen, of 1-arylamino-2-oxynaphthalenes. These naphthoquinones may be treated with a normal or acid sulphite to obtain 1-arylamino-2-oxynaphthalene sulphonic acids.

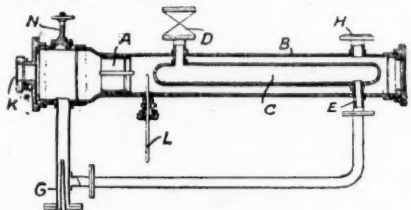
206,152–3. ORGANO-ARSENIC COMPOUNDS. Etablissements Poulenc Frères, 86, Rue Vieille du Temple, Paris, and C. Oechslin, 4, Rue des Noyers, Ablon, Seine-et-Oise, France. International Convention date, October 26, 1922. Additions to 191,028. (See THE CHEMICAL AGE, Vol. VIII., p. 215.)

206,152. An ethylene oxide compound, $X-CH-CH-Y$ (with O bridging the two CH), in which X represents an alkyl or aryl group, and Y a hydroxyl, carboxylic, etc., group, is treated with an alkali arsenite to obtain hydroxylated aliphatic arsinic acids. Examples are given of the use of propanol oxide and ethylene oxide carboxylic acid.

206,153. Hydroxylated aliphatic arsinic acids are obtained by the action of an alkali arsenite on a halohydrin containing other groups such as CN, COOH, $CH_2.AsO_3H_2$, and aromatic nuclei in the carbon chain. Examples are given of the use of β-oxy-α-chloropropionic acid or the nitrile of α-oxy-β-chloropropionic acid.

206,158. FORMALDEHYDE. Soc. des Etablissements Barbet, 5, Rue de l'Echelle, Paris. International Convention date, October 30, 1922.

Formaldehyde is made by the catalytic oxidation of methyl alcohol vapour. Air is admitted at D to the tube C, where it becomes heated by the hot gases in the outer tube B. The air passes through a pipe E to the inlet G for the methyl



206,158

alcohol vapour, and the mixture passes through a copper catalyst A, and then over the tube C to the outlet H. The reaction is started by withdrawing the plug N and heating the catalyst. An inspection opening K and pyrometer L are provided.

206,163–4–5. PRESERVING LATEX. N. S. Bostock, of Aiken Spence and Co., Colombo. International Convention date, October 30, 1922.

The coagulation of rubber latex is prevented by adding caustic soda, quicklime, slaked lime, or sodium carbonate, with or without known preservatives such as phenol, formaldehyde, or ammonia.

LATEST NOTIFICATIONS.

208,503. Apparatus for distilling water. Appareils et Evaporateurs Kestner. December 16, 1922.

208,516. Process for the recovery of nitrogen from molasses, vinasses, and like nitrogenous residues. Syndicat d'Etudes Chimiques. December 15, 1922.

208,548. Centrifugal separators. Plauson's (Parent Co.), Ltd. December 13, 1922.

208,551. Process and apparatus for the continuous chlorination of raw cellulose with a view to eliminating therefrom the non-cellulosic compounds. Vains, A. R. de. December 18, 1922.

208,555. Process for producing decolorising carbon. Naamlooze Vennootschap Algemeene Norit Maatschappij. November 19, 1921.

Applications for Patents

Bedford, J. Production of metal compounds for use as pigments, etc. 31,880. December 19.

Blumenfeld, J., and Weizmann, C. Titanium compounds. 32,209, 32,210. December 22.

British Synthetics, Ltd., and Higgins, E. B. Manufacture of azotic dyestuffs, etc. 31,889. December 19.

Brutzkus, M. Process of effecting chemical reactions in solutions. 31,627. December 17.

Compagnie Nationale de Matières Colorantes et de Produits Chimiques. Manufacture of dye-stuffs. 31,989. December 20. (France, December 21, 1922.)

Compagnie Nationale de Matières Colorantes et de Produits Chimiques. Manufacture of perylene. 31,990, 31,991. December 20. (France, December 21, 1922.)

Dick, J., Dick, Son, & Lewis, and Lewis, J. Sulphuretted-hydrogen apparatus. 31,616. December 17.

Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.). Manufacture of gelatin for emulsions. 32,214. December 22. (Germany, January 31.)

Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.). Electro-osmotic purification of glycerin. 32,215. December 22. (Germany, April 18.)

Farbwerke vorm. Meister, Lucius, and Brüning, and Imray, O. Y. Manufacture of blue vat dyestuffs. 32,213. December 22.

Kidd, H. L. Production of soda crystals. 31,634. December 17.

Lindsay, P., and Morgan Crucible Co., Ltd. Refractory materials. 31,656. December 17.

McEntire, F. W. Centrifugal separator. 31,767. December 18.

Monnet, C. Manufacture of oxide of iron. 31,774. December 18.

Salerni, E. M., and Salerni, P. M. Distillation, etc., of carbonaceous, etc., materials. 31,983. December 20.

Shaw, H. S. Hele-. Filters. 31,891. December 19.

Society of Chemical Industry in Basle. Manufacture of azo-dyestuffs. 32,216. December 22. (France, January 9.)

Wibaut, J. P. Manufacture of alkyl halides. 31,879. December 19. (Holland, January 12.)

Specifications Accepted, with Date of Application

187,220. Agglomeration of ore, Process and apparatus for. F. L. Smith and Co. October 11, 1921.

188,672. Revivification of finely powdered decolorising carbon and like absorbents, Apparatus for. Naamlooze Vennootschap Algemeene Norit Maatschappij. November 14, 1921. Addition to 104,456.

189,091. Benzaldehyde, Manufacture of. Barrett Co. September 12, 1922.

195,950. Separation of the constituents of gaseous mixtures containing hydrogen. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procedes G. Claude. April 4, 1922.

195,619. Cellulose compound indifferent to substantive colours, Process for the manufacture of. Textilwerk Horn Akt.-Ges. April 3, 1922

196,272. Converting Halogen substitution products of hydrocarbons into hydrocarbons or other halogen substitution products containing a higher number of carbon atoms. Farbwerke vorm. Meister, Lucius and Bruning. April 15, 1922.

196,901. Filtering apparatus. P. Dehne. April 25, 1922.

199,007. Sulphovinic acid from ethylene, Compagnie de Bethune. June 8, 1922.

204,302. Concentration of ores. A. B. Emery. September 21, 1922.

208,189. Hydrogenation of oils and fats, Lever Brothers, Ltd., and R. Thomas. August 8, 1922.

208,193. Synthetic resins, and process of making same. A. E. Alexander. (*J. S Stokes.*) August 11, 1922.

208,195. Sweating or crystallising paraffin wax, Apparatus for. Burmah Oil Co., Ltd., H. L. Allen, and J. Moore. August 15, 1922.

208,230. Lead alloys, Manufacture of. W. Mathesius and H. Mathesius. September 14, 1922.

208,235. Rubber, Manufacture of. P. Schidrowitz. September 14, 1922. Addition to 193,451.

208,247. Concentrating liquor to high densities, Apparatus for. A. Blair, and Blair, Campbell, and McLean, Ltd. September 20, 1922.

208,253. Filter presses. G. A. Renton. September 21, 1922.

208,267. Lubricants, Manufacture of. Plauson's (Parent Co.), Ltd. (*H. Plauson.*) September 29, 1922.

208,277. Treating coal, ores and the like. K. C. Appleyard, W. E. Manners, P. W. Bewick, Sir J. F. Laycock, and M. R. Portal. October 3, 1922.

208,282. Electric furnaces. L. J. Hancock and T. R. Hancock. October 6, 1922.

208,310. Cracking oils, Processes and apparatus for. J. F. Monnet. October 27, 1922.

208,326. Bringing gases and liquids into intimate contact, Apparatus for. W. C. Holmes and Co., Ltd., D. M. Henshaw, and J. Whittell. November 7, 1922.

208,357. Retorts for the distillation of carbonaceous materials, and for like purposes. T. W. S. Hutchins. November 28, 1922.

208,382. Sulphur-terpene emulsion, and process of producing the same. W. B. Pratt. December 19, 1922.

208,449. Dehydrating alcohol, Process of. H. Wade. (*Standard Development Co.*). March 3, 1923.

208,226. Concentration by flotation. P. T. Williams and Minerals Separation Ltd. September 13, 1922.

208,265. Tetrakisazo dyestuffs, Manufacture of. A. G. Bloxam. (*Akt.-Ges. für Anilin Fabrikation.*) September 27, 1922.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers ; those interested in close variations in prices should study the market report.*

London, January 3, 1924.

MARKETS are still under the influence of the holiday season and business has hardly opened as we write this report. There are, therefore, no changes of importance to note.

Prices are in the main unchanged and very firm. Export business has been fairly satisfactory.

General Chemicals

ACETONE continues in good request, and the price is well maintained.

ACID ACETIC is firm and in good demand.

ACID CITRIC is unchanged.

ACID FORMIC.—A moderate demand is reported at the advanced price.

ACID LACTIC is in good demand, without change in value.

ACID OXALIC is unchanged in value and in moderate demand.

ACID TARTARIC has been in better request, and higher prices are anticipated.

FORMALDEHYDE maintains its value, but demand is on the quiet side.

LEAD ACETATE is scarce and firm.

LEAD NITRATE.—A fair business has been transacted at current figures.

LIME ACETATE continues very scarce and producers are well sold for future delivery.

LITHOPONE is moderately active and the price unchanged.

POTASSIUM CAUSTIC AND CARBONATE.—Unchanged.

POTASSIUM PERMANGANATE is firm and inclined to be scarce.

POTASSIUM PRUSSIATE is unchanged in value, but the demand is poor.

SODIUM ACETATE meets only with a small inquiry, but the price is well held.

POTASSIUM BICHROMATE is in moderate request at British makers' figures.

POTASSIUM HYPOSULPHITE is in steady demand at English makers' price.

SODIUM NITRITE continues in short supply and is in good request.

SODIUM PHOSPHATE is active, and the price is inclined to go higher.

SODIUM PRUSSIATE has met with more inquiry, and there now seems to be a possibility of an improvement in value.

Pharmaceutical Chemicals

Owing to the holidays and the stocktaking period the business transacted has been on a small scale.

Prices are unchanged and there are no special features to report.

Coal Tar Intermediates

This market continues quiet and prices are on the whole without charge.

ALPHA NAPHTHYLAMINE has been inquired for on home account.

ANILINE OIL continues to pass regularly into consumption at home, with some small export inquiry in the market.

BENZIDINE BASE is in fair demand at recent values.

DIMETHYLANILINE.—Foreign buyers are interested.

NITRO BENZOL is unchanged.

PARANITROTOLUENE.—Inquiries have been received from the near Continent.

SULPHANILIC ACID.—A few home orders have been booked.

Coal Tar Products

No great change has taken place in the prices or market conditions in coal tar products since last week.

90 BENZOL is plentiful at 1s. 1d. to 1s. 1½d. per gallon on rails in tank wagons.

PURE BENZOL is also in poor demand, and is worth about 1s. 5d. to 1s. 6d. per gallon on rails.

CREOSOTE OIL is firm, with a steady demand, and is worth from 8¾d. to 9d. per gallon on rails in the North, while in London the price is 9¾d. to 10d. per gallon.

CRESYLIC ACID has no great inquiry, and is quoted at 1s. 10d. to 2s. per gallon on rails for the Pale quality 97/99%, while the Dark quality 95/97% is worth from 1s. 6d. to 1s. 8d. per gallon.

SOLVENT NAPHTHA is also plentiful, and is quoted from 11d. to 1s. per gallon on rails.

HEAVY NAPHTHA shows no change, and is worth about 1s. per gallon on rails.

NAPHTHALENES are steady at from £7 to £7 10s. per ton for the low quality, and £8 to £8 10s. per ton for 74/76, while 76/78 quality is quoted at £8 15s. to £9 per ton.

PITCH remains dull, and prices continue to ease off gradually. To-day's values are 90s. to 95s. per ton, f.o.b. London, and 85s. to 90s. f.o.b. East and West Coast.

Sulphate of Ammonia

The market remains unchanged.

Lævulose in Oat Straw

A PAPER was read lately at a meeting of the Physical and Chemical Sections of the Philosophical Society of the Armstrong College, Newcastle, by Mr. S. H. Collins, M.Sc., F.I.C., on "The Determination of Lævulose (Fructose) in Straw." In the course of some investigations on oat straw, the lecturer said, it became necessary to determine the amount of lævulose present. Unfortunately, the information on the determination of lævulose in the text books was very superficial. The dark colouring matters which accompanied crude forms of sugar gave considerable trouble and were the cause of much inaccuracy in the final results. The colouring matters have a high ratio to the sugar in the case of oat straw. The object of these investigations was to discover the average value of oat straw in cattle-feeding with special reference to the sugar contained. The lecture was summed up as follows. The high percentage of proteins is apparently due to the presence of much available nitrogen in soil and manure, while the high percentage of sugar appears to be due to the dry condition of the straw from as early after cutting as possible to the time of use. Damp conditions cause loss of sugar. There was considerable discussion, and a second paper followed, by Mr. W. M. Madgin, on "A method of determining the composition of solid solutions." The lecturer described solids generally obtained from liquid mixtures of two components and also an apparatus whereby the fusion of such solid mixtures could be obtained. Mr. R. G. Lunnan occupied the chair.

Centrifugal Concentration

IN connection with experimental work performed some time ago by the U.S. Department of the Interior at the Reno (Nevada) station of the Bureau of Mines, on the concentration of a zinc descloizite ore carrying vanadium, a laboratory size centrifugal concentrating bowl was developed for extracting metals from the slimes that represented the major portion of losses in the table concentration of the descloizite ore. More recent experiments indicate that the Bureau's concentrator may have a commercial application to a neglected field of metallurgy, the concentration of slimes that are not amenable to flotation, or that it may possibly compete with flotation itself in the treatment of some ores. Improvements evolved have been incorporated in a design for a small commercial machine with which further experiments may be conducted under plant conditions.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	125	0	0	to	126	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	51	0	0	to	52	0	0
Acetic, 40% pure	ton	26	0	0	to	27	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	11½	to	0	1	0
Citric	lb.	0	1	5	to	0	1	5½
Formic, 85%	ton	64	0	0	to	65	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	45	0	0	to	47	0	0
Nitric, 80 Tw.	ton	24	0	0	to	25	0	0
Oxalic	lb.	0	0	5½	to	0	0	6
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	0½	to	0	1	1
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	65	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	10	0	to	15	0	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	86	0	0	to	88	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	63	0	0	to	64	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	44	0	0	to	46	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	80	0	0	to	85	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10¼	to	0	0	10¾
Prussiate, red	lb.	0	2	8	to	0	2	10
Prussiate, yellow	lb.	0	0	10½	to	0	0	11
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4¼	to		—	
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3½
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	30	0	0	to	31	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	6	to		—	
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	0	11½	to	0	1	0
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	9	to	0	4	0
Acetanilid	lb.	0	3	3	to	0	3	6
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	10	to	0	3	3
Salicylic, B.P.	lb.	0	2	6	to	0	2	8
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	14	0	to	0	14	6
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	17	6	to	0	18	6
Beta naphthol resublimed	lb.	0	2	6	to	0	2	9
Bromide of ammonia	lb.	0	0	10½	to	0	1	0
Potash	lb.	0	0	9	to	0	0	9½
Soda	lb.	0	0	9½	to	0	0	10½
Caffeine, pure	lb.	0	12	3	to	0	12	9
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	3	to	0	2	6
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	4	3	to	0	4	6
Cocaine alkaloid	oz.	1	0	0	to	1	1	0
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	6	to	0	2	8
B.P. (75–80% eucalyptol)	lb.	0	2	7	to	0	2	9
Guaiacol carbonate	lb.	0	13	6	to	0	14	0
Liquid	lb.	0	12	6	to	0	13	0
Pure crystals	lb.	0	13	0	to	0	13	6
Hexamine	lb.	0	4	6	to	0	4	9
Hydroquinone	lb.	0	4	3	to	0	4	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	6
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	3	0	to	0	3	6
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt	4	2	6	to	4	10	0
Paraldehyde	lb.	0	1	7	to	0	1	9
Phenacetin	lb.	0	7	9	to	0	8	3
Phenazone	lb.	0	8	6	to	0	9	0
Phenolphthalein	lb.	0	8	3	to	0	8	6
Potassium sulpho guaiacolate	lb.	0	7	3	to	0	7	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	9	to	0	6	0
Salicylate of soda powder	lb.	0	3	0	to	0	3	3
Crystals	lb.	0	3	0	to	0	3	3
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	6	to	0	3	9
Sulphonal	lb.	0	17	0	to	0	18	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	3	6	to	1	4	6
Coal Tar Intermediates, &c.								
Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	9
Salts	lb.	0	0	9	to	0	0	9½
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	6	to	0	4	9
Sulphate	lb.	0	3	6	to	0	3	9
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	4	6	to	0	4	9
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	12	0
Bergamot		0	13	0
Cajaput		0	3	3
Camphor, white	per cwt.	4	0	0
Brown	„	3	15	0
Cassia	weak, c.i.f. 7/- spot	0	9	3
Cedarwood		0	1	6
Citronella (Ceylon)	easier, c.i.f. 3/9 spot	0	4	0
(Java)	firm, c.i.f. 4/4 spot	0	4	7
Clove		0	9	6
Eucalyptus	easier	0	2	4
Geranium Pourbon	scarce and firm	1	16	0
Lavender		1	6	0
Lavender Spike		0	3	3
Lemon		0	2	10
Lemongrass	per oz.	0	0	2½
Lime (distilled)		0	4	0
Orange sweet (Sicilian)		0	10	6
(West Indian)		0	8	6
Palmarosa		0	18	6
Peppermint (American)		0	16	0
Mint (dementholised Japanese)		0	12	3
Patchouli		1	5	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	9
Sandalwood		1	5	0
Sassafras		0	7	6
Thyme	2/6 to	0	8	0
Synthetics.				
Benzyl acetate	per lb.	0	3	3
Benzoate	„	0	3	6
Citral	„	0	9	6
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	2	6
Methyl salicylate	„	0	3	0
Musk xylol	dearer „	0	18	0
Terpeniol	„	0	2	9

The Nitrogen Industry in America

Outline of the Official Investigation

Dr. Howe, editor of *Industrial and Engineering Chemistry*, recently reviewed the steps taken by the United States Government to foster the nitrogen industry. These consisted of the following :—

(1) Congress passed the National Defence Act in 1916 authorising the President to make such investigation as he deemed necessary to determine the best, cheapest and most available means of producing nitrates.; (2) a very thorough investigation was made of the status of the industry in foreign countries. In the course of this survey several commissions were sent abroad ; (3) on the basis of the information thus obtained, the Government built the nitrate plants at Muscle Shoals and Sheffield, Alabama ; (4) the Fixed Nitrogen Research Laboratory now of the Department of Agriculture was established at Washington, D.C., to determine the possible peace-time utilisation of the product from the Muscle Shoals plant in case it were operated to supply such technical information as would assure a successful operation of the Sheffield plant, which information was not available at the time of its construction ; to study new methods of nitrogen fixation with the aim of reducing the cost of nitrogen in fertilisers ; to supply the newly developing nitrogen industry in the United States with the information which could be obtained only by intensive research and involving financial consideration beyond the scope of individual concerns ; (5) a commission was appointed through the Department of Commerce in 1923 to ascertain the present economic situation in the nitrogen industry ; (6) Congress is considering the peace-time utilisation of the Muscle Shoals properties, as is evidenced by its recent debates and subsequent discussions.

The results of these activities have been effective and far-reaching. In the brief time of five years America has emerged from a state of total ignorance of many of the more important features of the nitrogen fixation industry to a position of prominence among those nations which have been fostering the air nitrogen industry for a much longer period. While it is true that the United States have no large production at the present time, yet in case of emergency the country could proceed with confidence to erect large plants which would have an enormous output. The plant at Muscle Shoals has proved to be an entire success from the technical standpoint. It has, during a six weeks' test, produced fixed nitrogen from the air in the amount for which it was designed, and could resume equally satisfactory operations at any time.

Scientific Work in India

A copy of *The Journal* of the Science Association at the Maharajah's College, Vizianagaram, S. India (Nos. 2 and 3 combined in one issue) recently received, shows clearly something of the useful scientific work which is being done in many of the universities and colleges in India. The journal itself is of the form common to those issued by learned societies and contains abstracts of several papers recording research carried out by members of the college. The work described includes evidence for the production of triatomic hydrogen electrolytically, a note on the gravimetric estimation of red lead, a study of some phototropic compounds and some investigations in pure mathematics. In addition, there is a very full paper dealing with the " Classification of Lac Insects."

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, January 3, 1924.

BUSINESS in the heavy chemical market continues quiet, and there is little likelihood of improvement until after the New Year holiday.

Limited quantities of continental material are still arriving, good prices being obtained for them.

Industrial Chemicals

ACID ACETIC.—Spot material inclined to be scare and prices consequently a little firmer. Glacial, 98/100%, £60 to £67 per ton; 80% pure, £49 to £51 per ton; 80% technical, £47 to £48 per ton, packed in casks delivered, c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Still in little demand. Price unchanged at about 11¾d. per lb.

ACID CITRIC, B.P. CRYSTALS.—Rather better inquiry. Still on offer at about 1s. 4¾d. per lb., less 5 per cent. ex store.

ACID FORMIC, 85%.—Spot material still available at about £62 per ton, ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80%.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Spot material quoted 6d. per lb., ex store.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 1s. per lb., less 5 per cent. ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—Quoted £8 5s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots obtainable at about £8 12s. 6d. per ton, ex store.

ALUM CHROME.—Price unchanged at £26 to £28 per ton, according to quality, delivered f.o.b. U.K. port.

ALUM POTASH (LUMP).—English material quoted £10 17s. 6d. per ton, f.o.b. U.K. port for export.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £29 5s. per ton; powder, £31 per ton, f.o.b. U.K. port for export.

AMMONIA LIQUID, 880°.—Unchanged at 3d. per lb., delivered. Containers extra.

AMMONIA MURIATE.—Grey galvanisers, quality offered at £31 to £32 per ton ex station, spot delivery. Fine white crystals quoted £27 15s. per ton, ex store.

AMMONIA SULPHATE.—25¼% material, £13 2s. per ton; 25¾% neutral quality, £14 5s. per ton, ex works, January delivery.

ARSENIC, WHITE POWDERED.—In little demand but not much material available. Spot lots quoted £72 per ton, ex store. Offered from the continent at about £65 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE 98/100%.—English material unchanged at about £15 per ton, ex store.

BARYTES.—Finest white English unchanged at £5 5s. per ton, ex works. Good quality continental material offered at £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—English makers' price now £11 per ton, ex station, spot delivery. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Continental difficult to obtain and now quoted at round about the same figure.

COPPERAS, GREEN.—Price about £2 5s. per ton, f.o.b. U.K. port in bulk. Packed in casks about £4 per ton, f.o.b.

COPPER SULPHATE.—Price unchanged at about £25 per ton, less 5 per cent. f.o.b. U.K. port.

FORMALDEHYDE 40%.—On offer at £64 per ton, ex store, but could probably be obtained for less.

GLAUBER SALTS.—Fine white crystals on offer at about £3 10s. per ton, ex wharf, spot delivery. Still offering from the continent at about £3 per ton, c.i.f. U.K. port.

LEAD, RED.—English material unchanged at £45 per ton, carriage paid U.K. station. Continental about £37 per ton, c.i.f. U.K. ports. Spot material available at £37 15s. per ton, ex store.

LEAD, WHITE.—Little spot material available. Price about £41 per ton, ex store. Offered from the Continent at about £39 15s. per ton, c.i.f. U.K. port.

LEAD ACETATE, WHITE CRYSTALS.—Little spot material available. Quoted £46 per ton, ex store.

MAGNESITE CALCINED.—Finest English material offered at £8 per ton, ex station.

MAGNESIUM CHLORIDE.—Spot material still available at about £3 17s. 6d. per ton, ex store. Continental offers of about £2 15s. per ton, c.i.f. U.K. ports, prompt shipment.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton, ex store. B.P. quality £6 5s. per ton, ex station, prompt delivery.

POTASH CAUSTIC, 88/92%.—Spot material unchanged at about £34 per ton, ex store. Offered from the Continent at about £30 per ton, c.i.f. U.K. port.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Spot material still available at about £30 per ton, ex store. Offered from the continent at about £26 10s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Unchanged at about 3½d. per lb., ex store.

POTASSIUM NITRATE (Saltpetre).—Quoted £32 10s. per ton, ex store, spot delivery.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Unchanged at about 10½d. per lb., ex store, spot delivery.

POTASSIUM PRUSSIATE (Yellow).—In little demand. Quoted about 9½d. per lb., f.o.b. U.K. port for export. Spot material offered at about 10½d. per lb., ex station.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Unchanged at about £26 5s. per ton, ex store, spot delivery.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM CARBONATE.—Soda Crystals, £5 to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English makers' price about £10 per ton, ex station. Continental obtainable at about the same figure. Pea crystals quoted £15 per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality unchanged at about £13 5s. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE 100%.—Quoted £26 10s. to £28 10s. per ton according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (Yellow).—Now quoted 5d. per lb., delivered f.o.b. U.K. port for export. Spot material at about 5½d. per lb., ex store.

SODIUM SULPHATE (Saltcake).—Price for home consumption £4 5s. per ton, carriage paid stations. Good export inquiry.

SODIUM SULPHIDE.—60/62% solid, £15 per ton, ex station. Broken, £1 per ton more; 31/34% crystals, £9 7s. 6d. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 3¾d. per lb., f.o.b. U.K. port or delivered.

ZINC CHLORIDE 98/100%.—Moderate export inquiry now quoted £25 per ton, f.o.b. U.K. port.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Good demand. Price quoted 1s. 5½d. per lb., delivered.

BINTROTOLUOL.—Export inquiry. Price 1s. 1d. per lb., f.o.b., casks included.

NEVILLE WINTHER ACID.—Home inquiry. Price quoted 5s. 11d. per lb., 100% basis, delivered.

PARA AMIDO ACETANILIDE.—Home inquiry. Price 5s. 2d. per lb., 100% basis, delivered.

Sir S. W. Royse's Report

THE report issued by Sir S. W. Royse and Co., Ltd., of Manchester, for December takes the form of a review of the year, dealing in detail with the prices, imports and exports of the principal chemical products. In an introductory comment it is stated that business, though generally better than twelve months ago, has continued spasmodic and chiefly for near delivery, though recently rather more confidence has been apparent. The position has been dominated by the French occupation of the Ruhr district, which took place in January and which has had a bad effect on the course of foreign exchanges and interfered with trade. It is hoped, states the report, that the coming International discussions will assist towards a satisfactory solution of the European situation, without which no permanent improvement in business can be expected. The settlement in the Near East in August was a step in the right direction. Rates of railway carriage continued unchanged until August, when they were reduced from 60 to 50 per cent. above those ruling in January, 1920, and the Railway Rates Tribunal has before it proposals from the joint committee as to re-classification and general conditions of carriage. Rates of sea-freight generally are rather lower than they were twelve months ago. The export trade has continued under the influence of the adverse rates of exchange, which in some cases, notably Germany, France and Belgium, are much worse than they were at the end of 1922. The import trade has been again subject to considerable delays in shipments from the Continent and the recent decision of the German Government not to refund to its exporters the 26 per cent. Reparation Duty on shipments has hardened the prices of many imported products.

Purification of Aluminium Sulphate Solutions

THE success of experimental work on the purification of copper and zinc sulphate solutions, made by the U.S. Department of the Interior at the Pacific experiment station of the Bureau of Mines, suggested that possibly aluminium sulphate solutions could be purified of iron compounds and thus provide a much needed cheap process of producing iron-free alum and other aluminium salts, which are now twice as costly as the less pure salts and yet are used in large tonnages by the baking-powder makers and the paper mills, and for water purification. At present deposits of clay low in iron are the only ones that can be used for chemical purposes. Three different modifications of a laboratory method for hydrolytical removal of iron from aluminium sulphate solutions were worked out. Further experiments are being conducted by the Bureau of Mines with a view to developing this method into a practical process for preparing pure alumina direct from clays for use in the aluminium industry.

Low Temperature Carbonisation

THE *Gas World* of December 22 publishes an address by Professor H. E. Armstrong on Low Temperature Carbonisation, before the Yorkshire section of the Institution of Civil Engineers at Sheffield. Professor Armstrong makes a strong point that the low temperature carbonisation problem is not yet solved. The principal reason, he contends, is to be found in the absence of any competent body behind the enterprise. Though there are many workers in the experimental field no one, according to Professor Armstrong's view, has yet "delivered the goods" entire—gas, oil and coke. The peculiar character of the tar has become the subject of comment, and there is the need for removing sulphur from the coal by washing; but beyond all that, no one, it is contended, has yet succeeded in erecting a gas-tight plant.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, January 3, 1924.

Last week, for all practical purposes, was a dead one so far as business on the chemical market here was concerned, although more business has been done this week, chiefly in the direction of closing contracts for delivery over the current year, "spot" transactions having been on a comparatively small scale. Traders are rather optimistic regarding prospects for the next twelve months and it is probable that a steady resumption of trade will be recorded within the next week or two. In the meantime prices keep fairly firm, although in a few instances quotations have been shaded.

Heavy Chemicals

A rather good export inquiry for saltcake is reported, with home demand still only quiet; prices continue round £4 10s. per ton. Caustic soda keeps firm at from £16 17s. 6d. per ton for 60 per cent. material to £19 7s. 6d. for 76–77 per cent.; foreign demand is fairly active, with home consumption on a moderate scale. Hyposulphite of soda is quiet at £9 10s. per ton for commercial quality and round £15 for photographic crystals. Bleaching powder is meeting with a quietly steady demand at the reduced price of £10 per ton, in casks. Alkali is quoted at £7 per ton for 58 per cent. quality, a moderate amount of business being done. Phosphate of soda is inactive but fairly steady at £14 to £14 10s. per ton. Sulphide of sodium is still quoted at £14 10s. for 60–65 per cent. concentrated solid and £9 10s. per ton for crystals; demand, however, has not improved much. Nitrite of soda is scarce and firm at £28 10s. to £29 per ton. Glauber salts keep quiet but unchanged at £3 10s. per ton. Prussiate of soda sells slowly and quotations are weak, current values being between 5d. and 5¼d. per lb. Bicarbonate of soda is steady and in fair demand at £10 10s. per ton. Soda crystals still only attract moderate attention at £5 5s. per ton. Bichromate of soda is steady and in moderate inquiry at 4¾d. per lb. Chlorate of soda is quiet but unchanged at round 3d. per lb. Acetate of soda continues steady at £23 10s. per ton, although little business is being put through.

A quietly steady demand for caustic and carbonate of potash is reported; caustic is offering at round £32 per ton for 90 per cent. strength and carbonate at about £26 for 90 and £28 per ton for 96 per cent. material. Yellow prussiate of potash is a shade cheaper than at last report and business is still quiet; to-day's value is 9¾d. per lb. Chlorate of potash is quoted at 3d. per lb., a quietly steady demand being met with. Permanganate of potash is inactive and supplies are offering at 8½d. to 9¼d. per lb. according to quality.

The export demand for arsenic is quieter, although quotations are rather steady at about £68 per ton for white powdered, Cornish makes. Sulphate of copper is said to have improved a little and values are steady at between £25 and £26 per ton, f.o.b. Epsom salts attract a moderate amount of attention; prices show little change, commercial being offered at £4 5s. to £4 10s. per ton, and magnesium sulphate, B.P., at £6 5s. Grey acetate of lime keeps quiet at £21 per ton; brown is rather scarce at £14. Acetate of lead is steady, with white still quoted at £45 and rather more being asked for brown. Nitrate of lead is unchanged at £43 to £44 per ton, with the demand on a moderate scale.

Acids and Tar Products

Acetic acid is steadily maintained at £46 per ton for 80 per cent. commercial and £65 for glacial; the demand is fairly active. Tartaric acid is quiet at 1s. 2d. per lb., as is also citric which is quoted at about 1s. 4½d. Oxalic acid is lifeless although the price is unchanged at 5¾d. per lb.

Pitch buyers are marking time and values are easier at about £5 per ton, Manchester. Creosote oil is steady and fairly active at 10d. per gallon. Solvent naphtha is only in moderate request at round 1s. 3d. per gallon. Refined naphthalene is quoted at £19 per ton and crude at £6 to £11; demand, however, is far from brisk. Carbolic acid is firm at 2s. 9d. to 3s. per gallon for crude, crystals being maintained at about 1s. per lb.

Company News

THE EGYPTIAN SALT AND SODA CO., LTD.—It is announced that a dividend of 7½ per cent., less income tax, for the year ending August 31st, will be paid on and after January 7.

GOODLASS, WALL AND CO.—Warrants for the half year interest to the end of December on the 7½ per cent. cumulative preference shares have been posted.

B. LAPORTE (LTD.).—Dividends at the rate of 6 per cent. and 7½ per cent. per annum are announced on the respective preference shares for the past half-year.

ALLEN-LIVERSIDGE, LTD.—A final dividend is announced at the rate of 15 per cent. per annum, less tax, for the six months to October 31 last, making 12½ per cent. for the year, against 8 per cent. for 1921–22.

NEW TRANSVAAL CHEMICAL CO.—Final dividends have been declared for the year to June 30 last at the rate of 3 per cent., less tax, on the cumulative first preference shares, and 4 per cent., less tax, on the cumulative "A" preference shares.

BECKER AND CO. (LTD.).—A special meeting of the shareholders was held in London on Monday, December 31, when a resolution was adopted for voluntary liquidation, and Mr. J. H. Stephens (of the firm of Lescher, Stephens and Co.) was appointed liquidator.

BRITISH OIL AND CAKE MILLS, LTD.—The retirement is announced, as from December 31st last, of Mr. T. C. M'Cay, senior manager of the Liverpool branches of the British Oil and Cake Mills, Ltd. The managing committee have arranged to consolidate the working of the branches in Liverpool and Manchester under the joint management of Messrs. George Allday, R. W. M'Cay, and George A. Sidders.

DOMINION GLASS CO.—The accounts for the year ended September 30 last show gross profits of $724,664, which is very near to the record year of 1920, and the balance of net profits has permitted the payment of the preferred dividend and an increased dividend on the common shares, leaving a surplus of $75,164 to add to the total surplus account, which now stands at $1,004,848. The principal change in the balance sheet is the writing down of goodwill, patent rights, etc., by $400,000.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

DYE POWDERS, ETC., REQUIRED IN U.S.A.—H.M. Consul-General at Philadelphia reports that he has received an inquiry for British made dye powders, soluble in non-drying oil, in black, red, and blue, for use in the process of inking typewriter ribbons. (Reference D.O.T. 21437/FW./C.C./2.)

DRUGS AND PHARMACEUTICAL PRODUCTS, ETC., FOR SPAIN.—A commission agent of Barcelona is desirous of securing the representation of British exporters of drugs, pharmaceutical products, rubber and rubber goods. (Reference No. 18.)

Heavy Chemicals for Canadian Soap Manufacturer

THE Department of Overseas Trade inform us that a Canadian firm of soap manufacturers are desirous of receiving quotations for soda ash and caustic soda from United Kingdom manufacturers of heavy chemicals. The firm use about 1,000 tons of each commodity per annum. Manufacturers desirous of receiving further particulars should apply to the Department, 35, Old Queen Street, London, S.W.1, quoting reference 12842/E.D./C.C. (2).

Tariff Change

PORTUGAL.—An import duty has been imposed on magnesite, calcined or not, of 1·2 cts. per kilog under the Maximum tariff, and 0·6 ct. under the Minimum tariff.

"Chemical Age" Inquiry List

The following inquiry has been received from a reader of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bouverie Street, London, E.C.4, will be forwarded to the inquirer.

A LONDON firm of chemical merchants require the name and addresses of manufacturers of Oropon and Confit-wood No. H.32.

Photographic Materials for Egypt

THE Ministry of Interior, Egypt, is calling for tenders to be presented by noon on March 15, for the supply for the year 1924 of various photographic materials, including plates, paper, apparatus and miscellaneous chemicals. Further particulars may be obtained from the Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. Reference No. 12109/F.E./C.C./2.

Catalogues Received

G. A. COWIE, M.A., B.Sc., F.I.C.—Mr. Cowie's latest leaflet deals with fertilisers for grassland, and the photographs given clearly show the value of adding a proportion of kainit to the phosphate fertiliser used for this purpose. Copies of the leaflet will be forwarded on application to 39, Victoria Street, London, S.W.1.

CROSSLEY BROTHERS, LTD.—An attractive illustrated brochure recently issued by this firm, of Openshaw, near Manchester, shows specimens of the wide range of oil and gas engines of different types and sizes manufactured by them. Further particulars will be forwarded to readers interested on application to the firm.

AUTOMATIC AND ELECTRIC FURNACES, LTD.—Illustrated leaflets describing electric furnaces for hardening high-speed steel at 1,300° C., and for annealing steel at 800° C. or annealing copper at 400° C., have recently been issued by this firm from Elecfurn Works, Farringdon Road, London, E.C.1. Useful practical details as to methods of working, determining temperatures, etc., are given in each case.

THE LEEDS AND BRADFORD BOILER CO., LTD.—A firm of boiler manufacturers is naturally in a favourable position to manufacture heating vessels of various kinds other than boilers, and an illustrated folder recently issued by this firm of Stanningley, near Leeds, draws attention to a number of such specialities, including tar stills, digesters, acid eggs, jacketed pans, crystallisers, condensers, storagetanks for various liquors, etc.

THE STANTON IRONWORKS CO., LTD.—Stantonite is the name of a preparation described in a leaflet issued by this firm, which is intended to be used with five times its weight of cement for making floorings which are claimed to be dustless, waterproof, oilproof, and wear resisting. Particulars of this and other uses will be sent on application to the works near Nottingham. The same firm issue a monthly list of their speciality—iron pipes—giving the sizes and types actually in stock ready for immediate delivery.

HEADLEY AND CO. (LEYTONSTONE) LTD.—Solutions of various drugs in ethyl chloride are supplied by this firm of 120, Harrow Road, Leytonstone, London, E.11, under the name "Dridustol." When the solutions are sprayed at the proper temperature (65° F.) the drug is deposited in the form of a fine dry powder which is very useful in some medical work such as the treatment of wounds, etc. A list containing some 50 drugs is issued, and other drugs can be put up to customers' requirements.

HERBERT MORRIS, LTD.—An illustrated catalogue (No. 81) recently issued by this firm describes a number of types of electrically operated hoist blocks. These are of various sizes and appear very well designed. They may be adapted to various uses, as the majority of them are portable and can be readily moved as the necessity arises to the point where loads are to be lifted. The same list also contains brief particulars of the firm's overhead cranes and telphers. The catalogue will be forwarded to those interested on application to the works at Loughborough.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

SANDAY, A. B. (trading as ISLAND PERFUMERY CO.), 1, St. Thomas Street, Ryde, perfumer. (C.C., 5/1/24.) £13 9s. October 24.

TREECE, George Dyson, 28, Langley Road, Watford, polish manufacturer. (C.C., 5/1/24.) £63 2s. November 5.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

NORDEN BLEACHING CO., LTD. (M., 5/1/24.) Registered December 19, £2,500 mortgage, to Mrs. E. Heap, Clavadel, Boundary Road, Worthing; charged on Shepherd Mill, etc., Norden. £3,000 debentures. March 9, 1923.

London Gazette

Companies Winding Up Voluntarily

AUSTRALIAN COKING AND BY-PRODUCTS CO., LTD. (C.W.U.V., 5/1/24.) Alfred W. Deering, chartered Secretary, appointed liquidator. Meeting of creditors, 196, Gresham House, Old Broad Street, London, E.C., on Monday, January 7th, at 3 p.m.

BRITISH DYESTUFFS CORPORATION (HUDDERSFIELD), LTD. (C.W.U.V., 5/1/24.) At an extraordinary general meeting of the above-named Company, duly convened, and held at 70, Spring Gardens, Manchester, on the 21st day of November, 1923, the following Special Resolutions were duly passed; and at a subsequent extraordinary general meeting, also duly convened, and held at the same place on the 6th day of December, 1923, the following Resolutions were duly confirmed:—

"That the Company be wound up voluntarily and that D. R. Mackay, 70, Spring Gardens, Manchester, be appointed liquidator for the purposes of such winding up."

"That the offer dated the 31st October, 1923, made by British Dyestuffs Corporation Limited to purchase the undertaking of this Company a copy of which has been laid before this Meeting be and the same is hereby approved and that the said Liquidator be and he is hereby authorised to accept such offer and to sell and transfer the undertaking of the Company to British Dyestuffs Corporation Limited on the terms of such offer."

BRITISH DYESTUFFS CORPORATION (BLACKLEY), LTD. (C.W.U.V., 5/1/24.) D. R. Mackay, 70, Spring Gardens, Manchester, appointed liquidator.

DUNESE (POLISHES AND PREPARATIONS), LTD. (C.W.U.V., 5/1/24.) H. J. Stephens, 20, Copthall Avenue, London, E.C.2, appointed liquidator, and authorised to assent to a company being registered with the same or similar title. Meeting of creditors 20, Copthall Avenue (Rooms 387 to 389), London, at 12 noon, on Tuesday, January 8. Creditors' claims by January 20.

LAMPLOUGH (HENRY), LTD. (C.W.U.V., 5/1/24.) B. Dennett Holroyd, chartered accountant, 6, Great Winchester Street, London, E.C.2, appointed liquidator. Meeting of creditors, 6, Great Winchester Street, Old Broad Street, E.C.2, on Tuesday, January 15th, at 2 p.m.

TAYLOR (F. HOWARD) AND CO., LTD. (C.W.U.V., 5/1/24.) P. S. Booth, certified accountant, 2, Bixteth Street, Liverpool, appointed liquidator.

Edinburgh Gazette

BROWN (I. AND B. BARING) AND CO., LTD., manure cake merchants, Edinburgh. (C.W.U.V., 5/1/24.) C. Maitland Smith, C.A., 4A, York Place, Edinburgh, appointed liquidator. Meeting of creditors at liquidator's office on Monday, January 7, 1924, at 2.30 p.m.

New Companies Registered

BIO-MEDICAL CO., LTD., Vernon House, 40, Shaftesbury Avenue, London, W.1. To engage in research work and bio-chemistry; chemists, druggists, chemical manufacturers and dealers, drysalters, etc. Nominal capital, £13,000 in 10,000 10 per cent. founders' preference shares of £1 and 60,000 ordinary shares of 1s.

P. MOIR CRANE [illegible]D CO., LTD. Oil manufacturers; manufacturers [illegible] refiners of paraffin scale wax and stearine; man[illegible]cturers of candles, etc. Nominal capital, £5,000 in [illegible]shares. Solicitors: R. and W. Page, Lloyd's Bank Ch[illegible]bers, King Street, Manchester.

CRYSTAL PURE D[illegible]G CO., LTD., 64, St. George's Road, Glasgow. Chem[illegible], drug grinders, drysalters, etc. Nominal capital, [illegible],500 in £1 shares (750 7 per cent. cumulative prefer[illegible]e and 750 ordinary).

EVANS AND SONS' PHARMACIES, LTD., 33, Rheola Street, Penrhiwceiber, Glam. Dealers in oils, colours, etc. Nominal capital, £300 in £1 shares.

FOX AND CO (CHEMICALS), LTD., 16, Atkinson Street, Deansgate, Manchester. Agents for chemicals, factors, general merchants, wholesalers, retailers, etc. Nominal capital, £2,000 in £1 shares.

HASSON SOAP AND CHEMICAL CO., LTD., Ridyard Street, Little Hulton, near Bolton. Soap and chemical manufacturers; manufacturers of and dealers in lubricating oils and greases, starch, etc. Nominal capital, £2,500 in £1 shares.

THE TENNAMARAM PALM OIL CO., LTD., 7, Crosby Square, London, E.C.2. To acquire estates in which oil palms, rubber, indigo, and other produce is grown, or which are suitable for the cultivation of oil palms or such other produce as aforesaid. Nominal capital, £100,000 in 70,000 ordinary and 30,000 6 per cent. cumulative participating preference shares of £1 each.

Chemical Traders' Failure

THE first meeting of the creditors of John R.-Scholes and Co., Ltd., 14, Argyll Chambers, 67, Hanging Ditch, Manchester, was held recently at the Official Receiver's Offices, Byrom Street, Manchester. According to the statement of affairs there was a deficiency as regards the creditors of £7,734, and as regards the contributories of £8,534. The deficiency account showed that at the formation of the company there was a deficiency of £2,188, and a trading loss of £1,439. The failure of the company was attributed to bad trade, bad debts, lack of capital, depreciation of stocks, differences on forward contracts, and law costs.

The Official Receiver said that the directors apparently continued the company's trading after they were aware of its position, goods being supplied practically up to the date of the winding-up order. About sixty writs and summonses had been served on the company. About March 14 the company issued debentures for an alleged advance of £400 on the whole of its property, and the holder of the debenture transferred £300 to a relative of the promoter on September 24. The Receiver for the debenture holders had taken possession of the assets. It was stated that the company had obtained goods from all over the country. There did not appear to be anything for the creditors. The company had dealt in chemicals, lead, zinc, charcoal, turpentine, paraffin, ammonia, paint, varnish, soap, and other articles.

The creditors appointed Mr. A. T. Eaves (H. L. Price and Co., Manchester) as liquidator, with a committee of inspection.